ELECTRICAL TIMES

(Above) The Pyhäkoski Power Station, total output 108 MW, the largest in Finland.
(Right) One of the completed transformers in commission at the Pyhäkoski Generating Station.

5 *now in commission*

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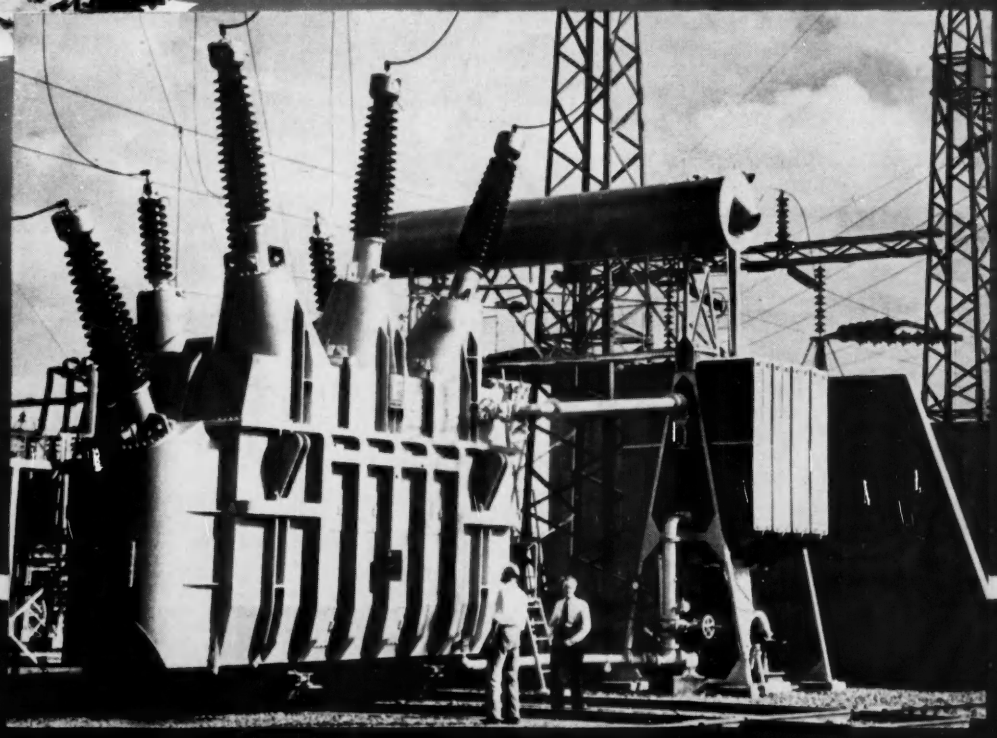

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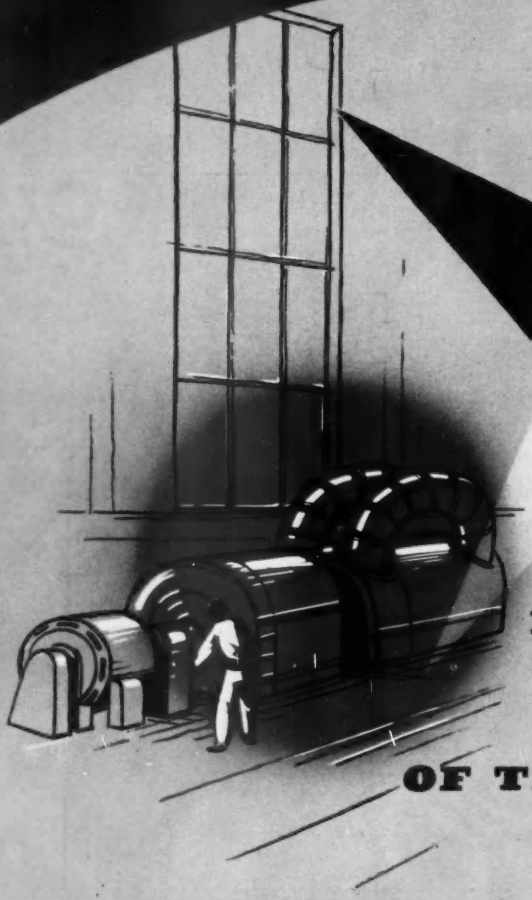

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Nife equipment is exceptionally compact and there is no need for a separate battery room.

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the emergency equipment with the steel-alkaline battery

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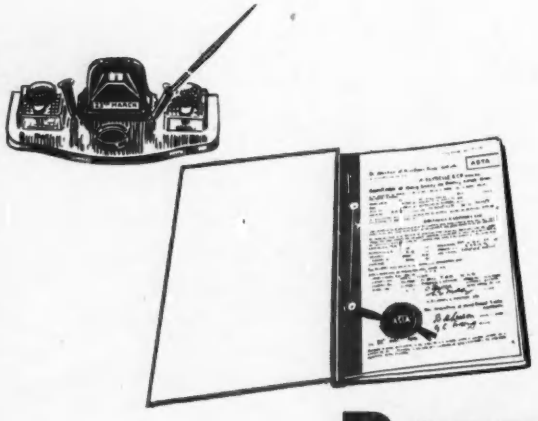

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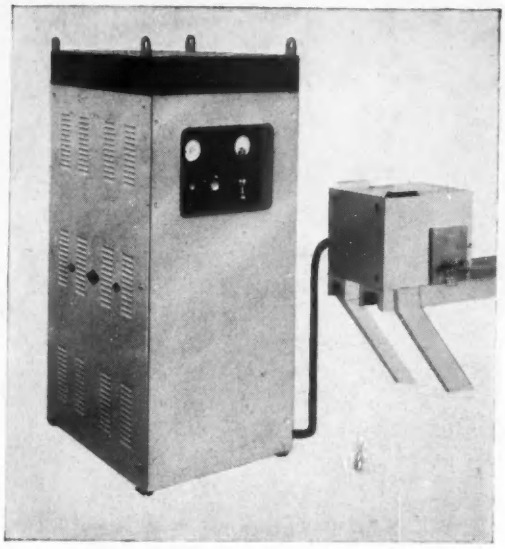

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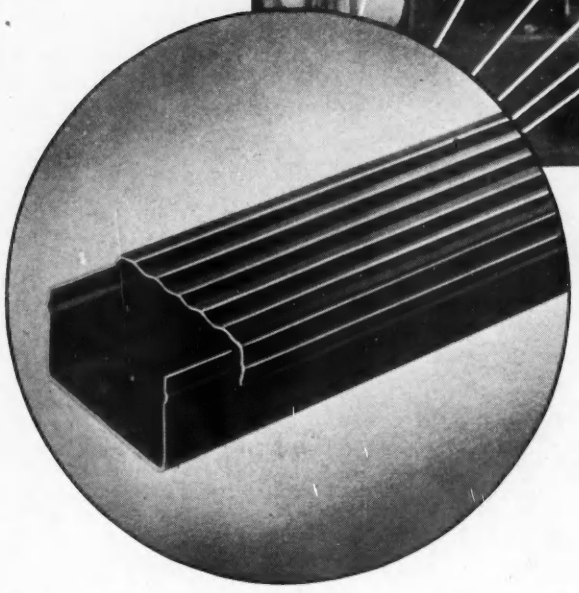
In this view of the loom section of Adamjee No. 1 Mill B.T.H. fluorescent lighting fittings are seen attached to 2" x 1" Channel Conduit.

(Photograph reproduced by permission of Engineering Consultant H. M. NIMMO, M.Sc., B.E., A.M.I.E.E.)



The Adamjee Mills at Narayanganj in the Dominion of Pakistan are claimed to be the largest of their kind in the world. Each of the three mills covers an area of about 500,000 sq. ft.

These mills are illuminated by more than 6,500 fluorescent fittings which are supported by 2" x 1" Channel Conduit. Altogether, some 150,000 feet of this cable trunking has been installed. It carries all the circuit wiring and has resulted in exceptionally low installation costs.

★ *Channel Spring Capped Conduit costs less to buy, install and maintain than any other form of cable trunking. For full information, write or 'phone for a copy of pamphlet R.A. 16.*

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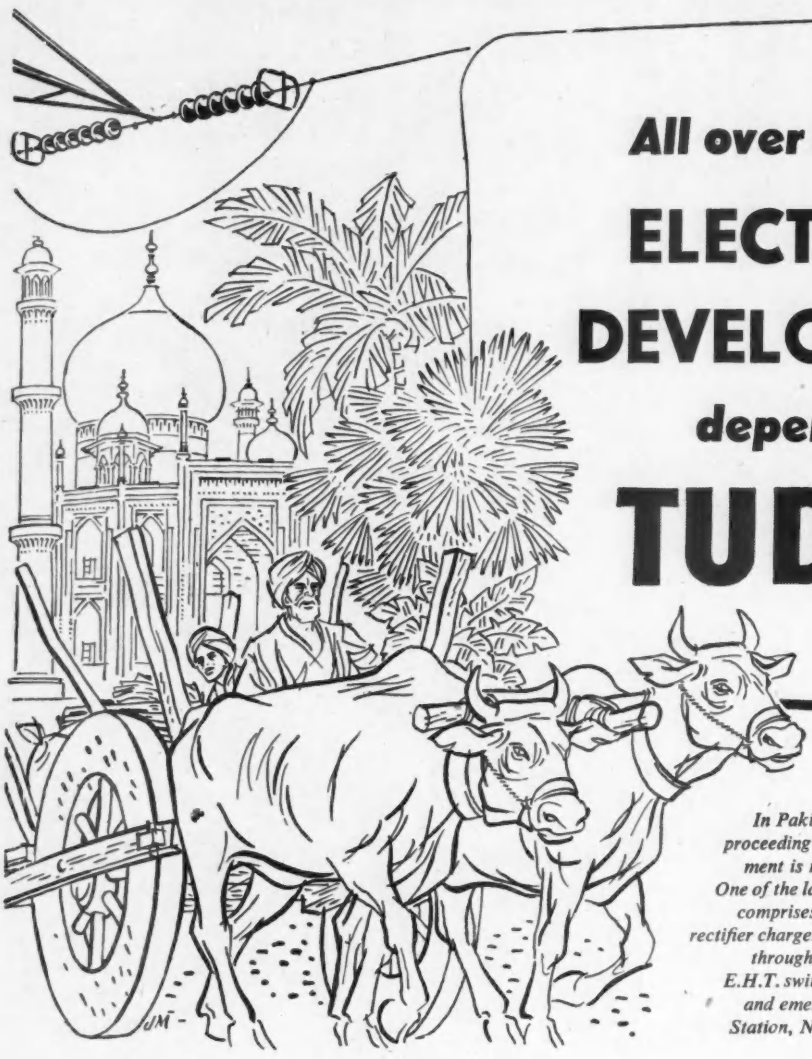

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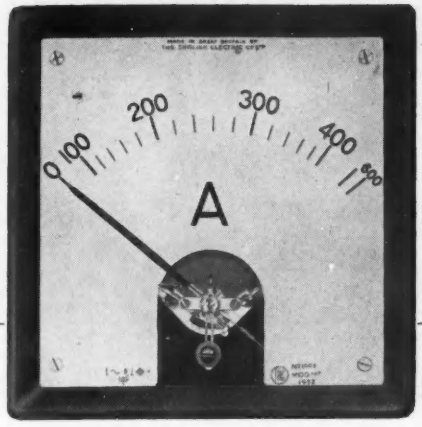

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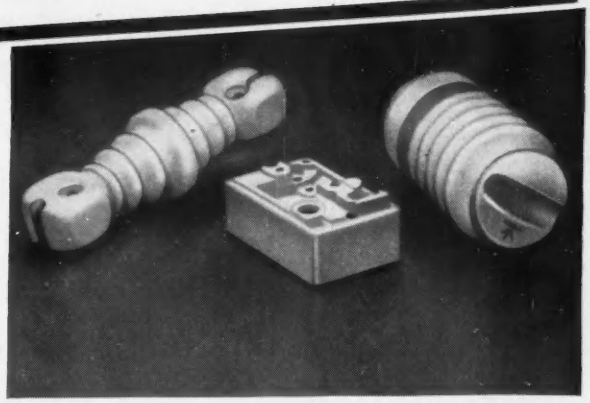

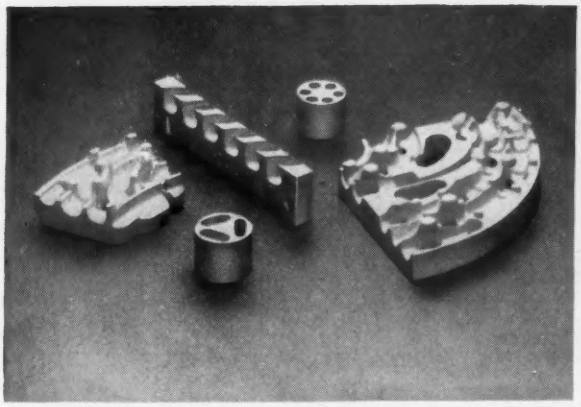

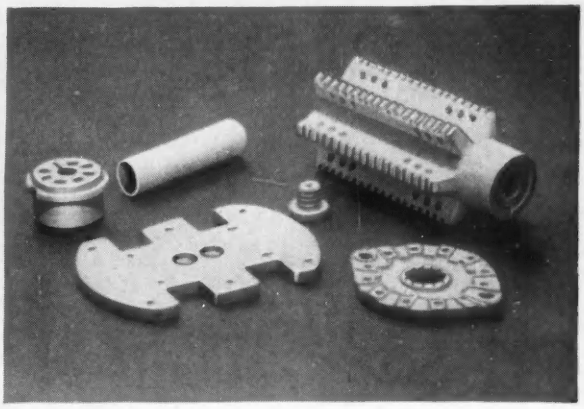

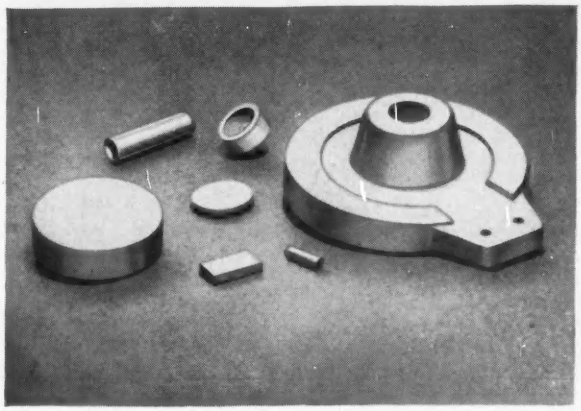

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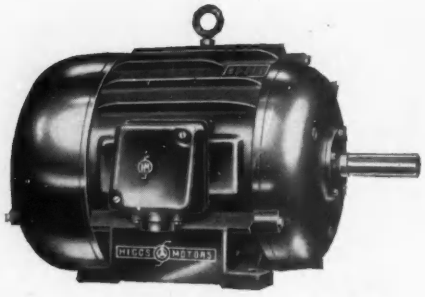

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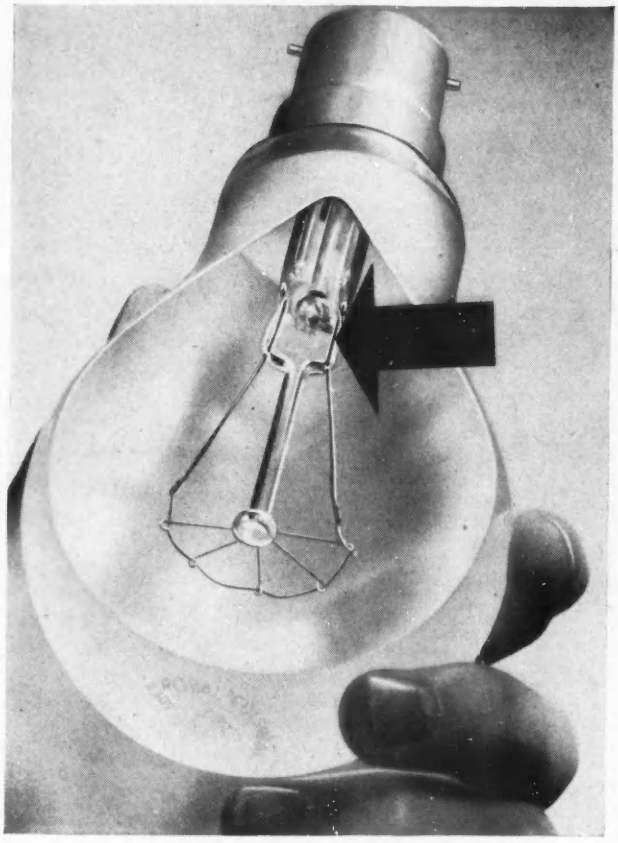

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* *This is but one example of the intricate operations in the manufacture of Royal "Ediswan" Lamps, calling for the highest degree of skill and the utmost care and precision.* Nothing is left to chance—*only the finest materials are used and there is strict control at each stage of manufacture.*

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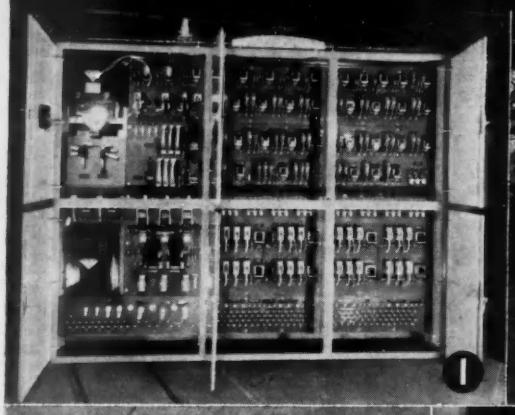

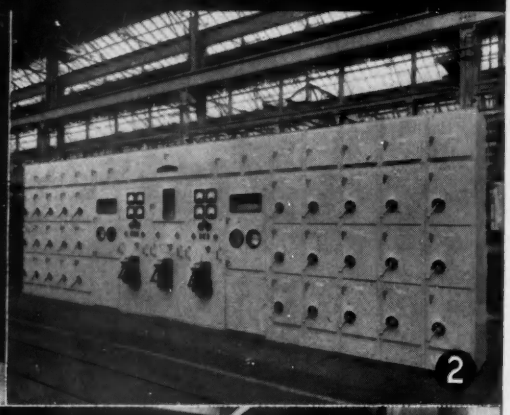

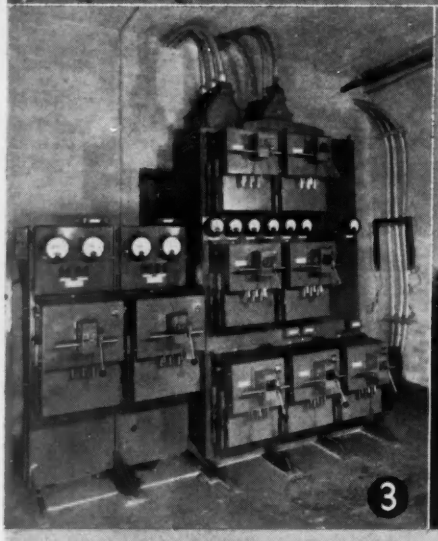

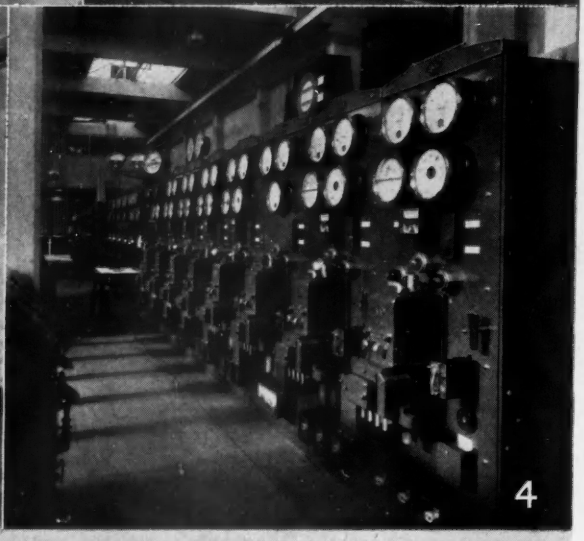

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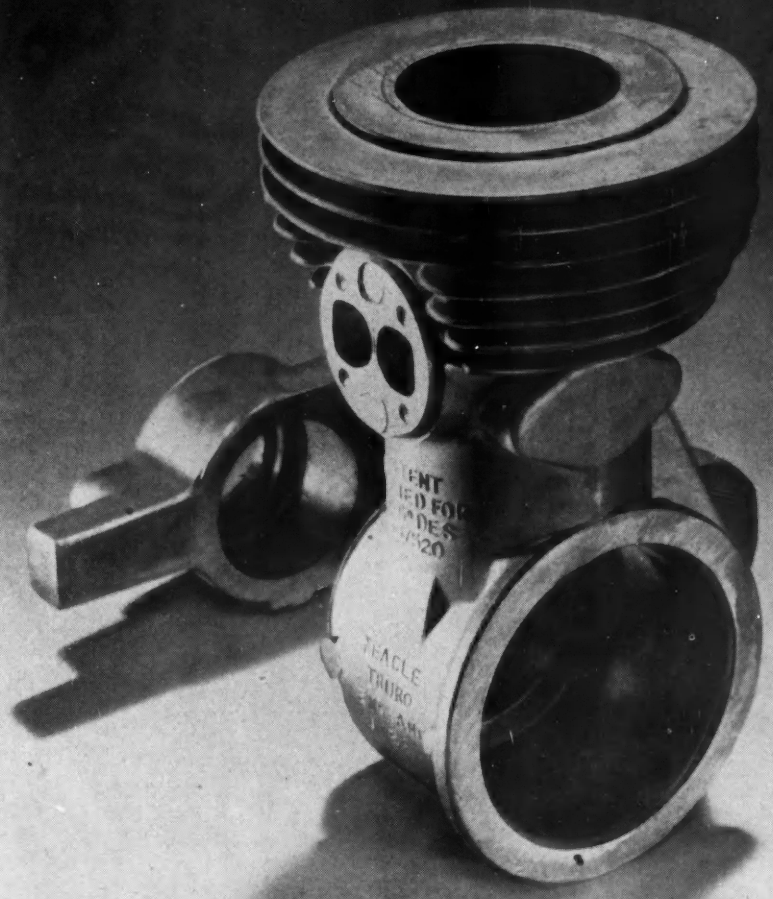

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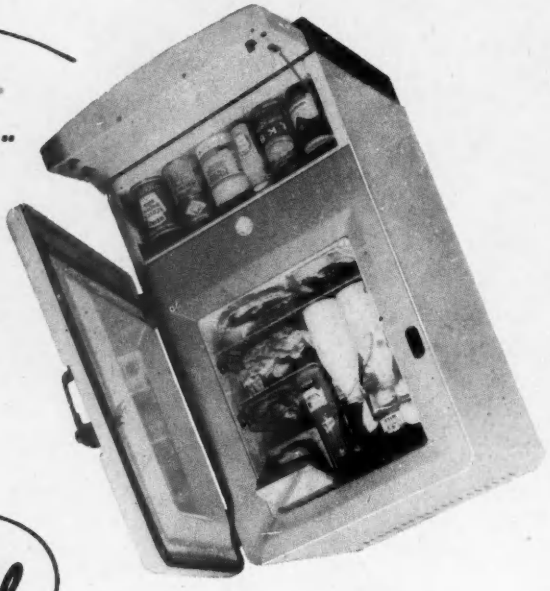

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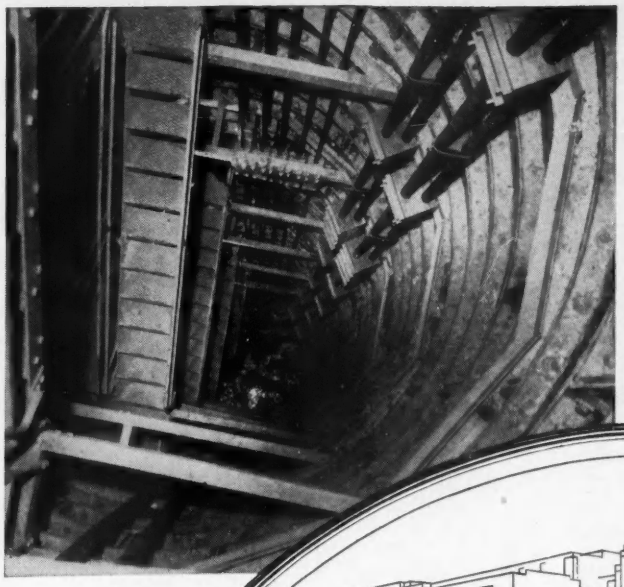
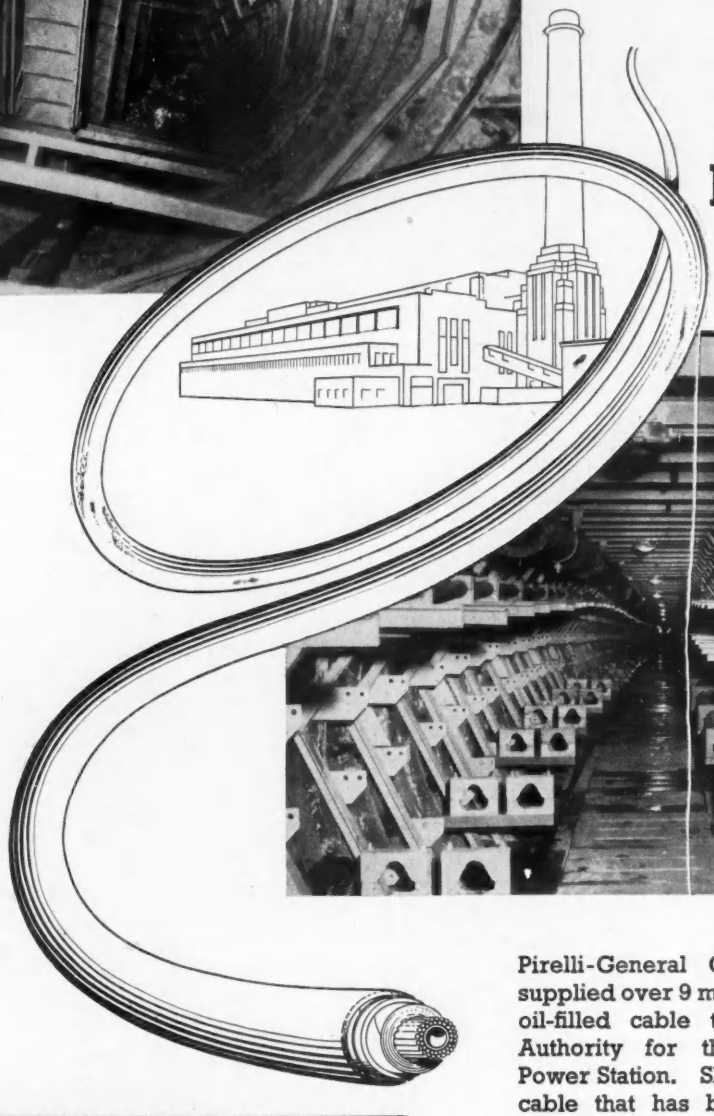
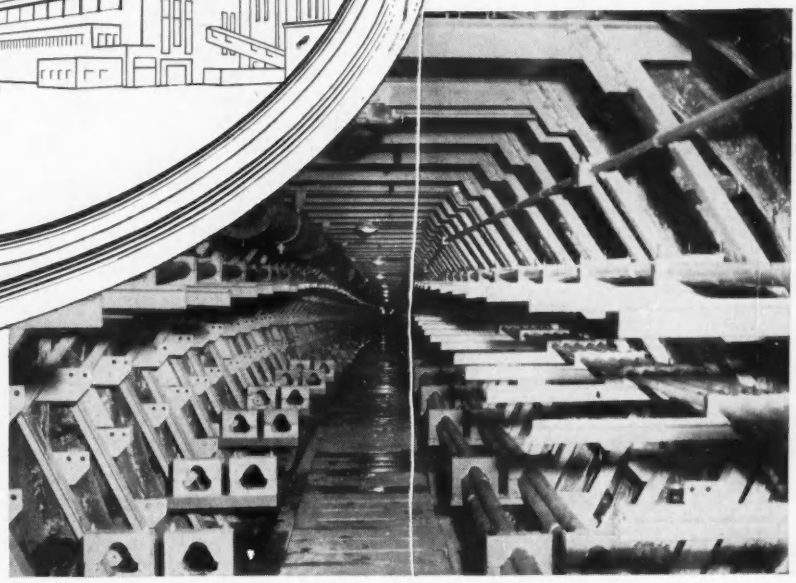


Nine miles

of 132 kV. OIL-FILLED CABLE for BRIGHTON "B"





Pirelli-General Cable Works Ltd. have supplied over 9 miles of single core 132 kV. oil-filled cable to the British Electricity Authority for the new Brighton "B" Power Station. Shown here is some of the cable that has been laid in a specially constructed tunnel under Shoreham Harbour, which connects two of the generator transformers to the Southern Cross Switching Station.

PIRELLI-GENERAL *cables*

PIRELLI-GENERAL CABLE WORKS LIMITED — Southampton

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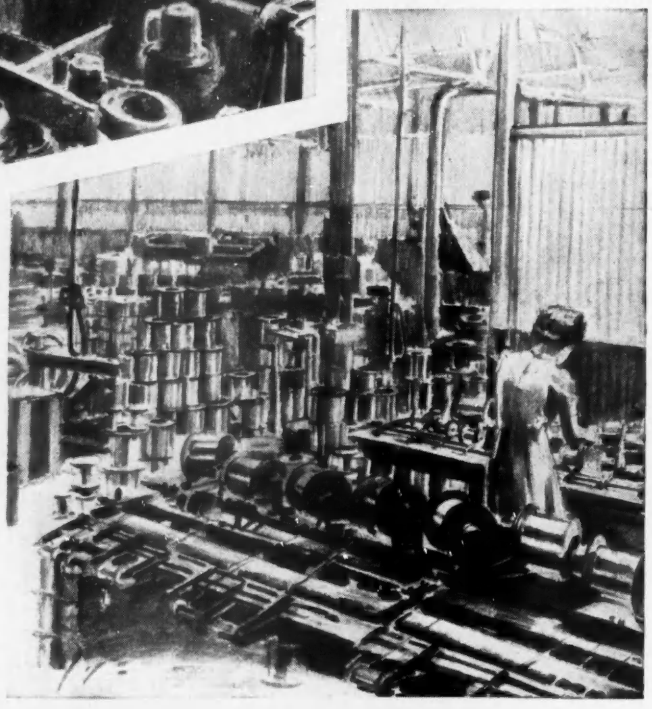

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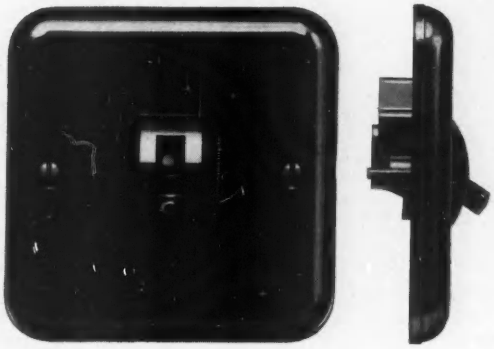
- A competitive switch of robust construction, in every way comparable with the other sturdy "Lincoln" wiring accessories.



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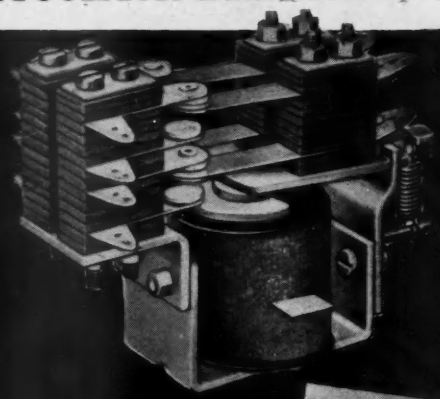

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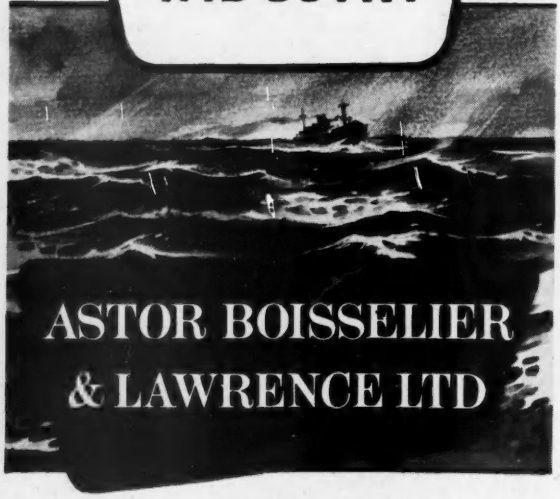

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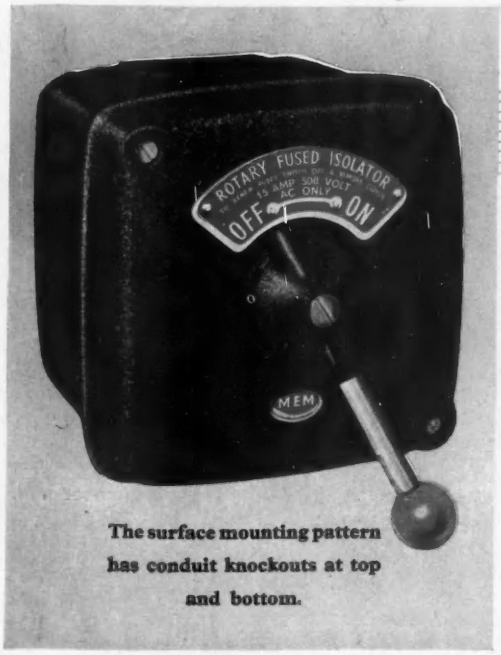

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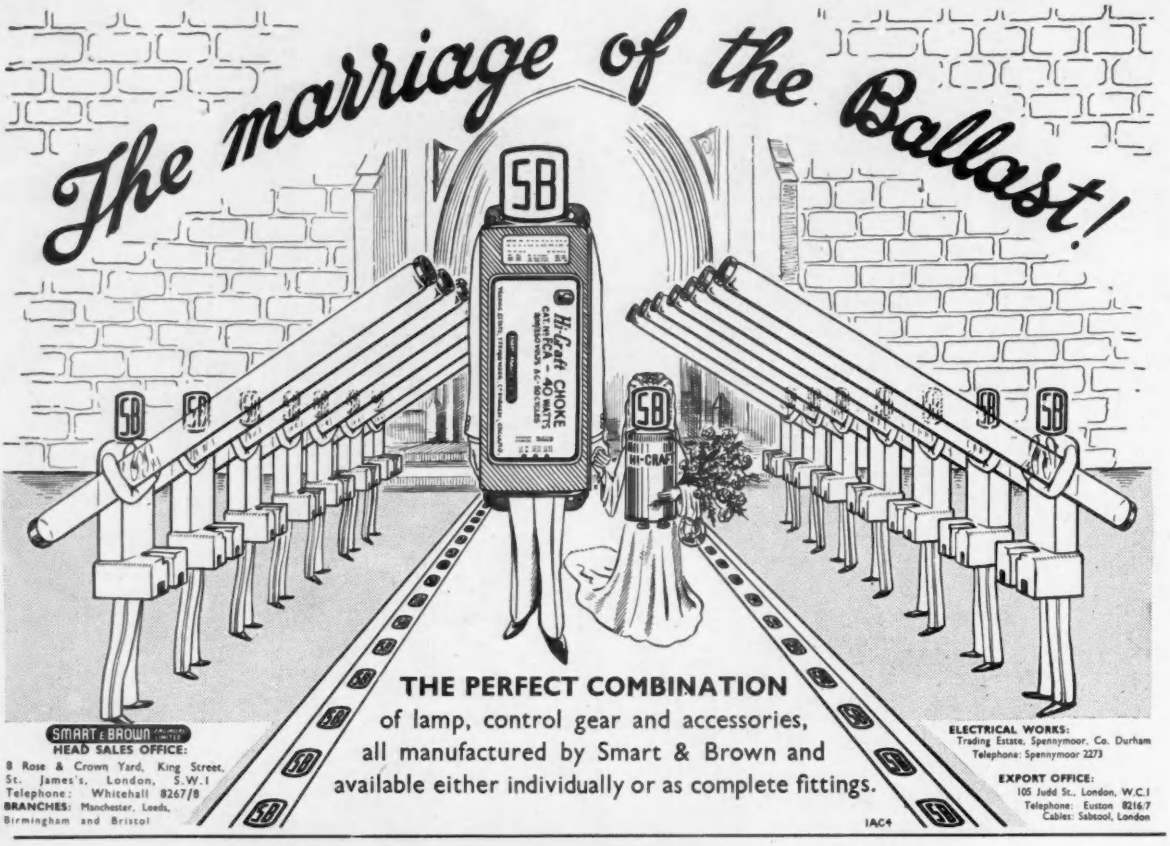

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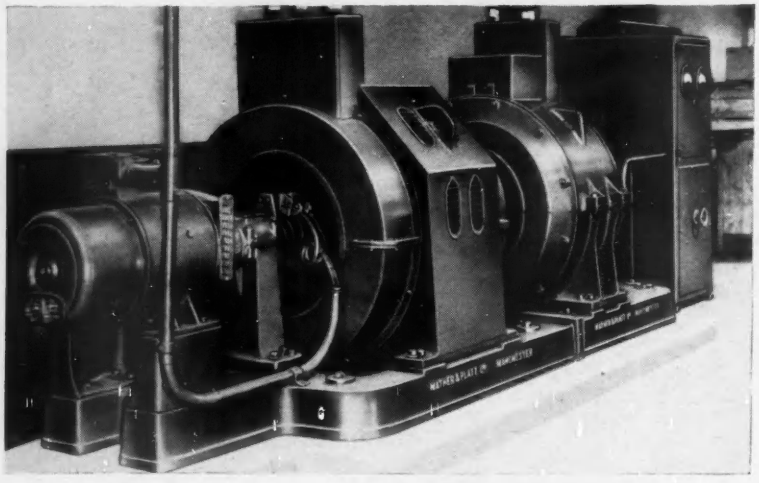

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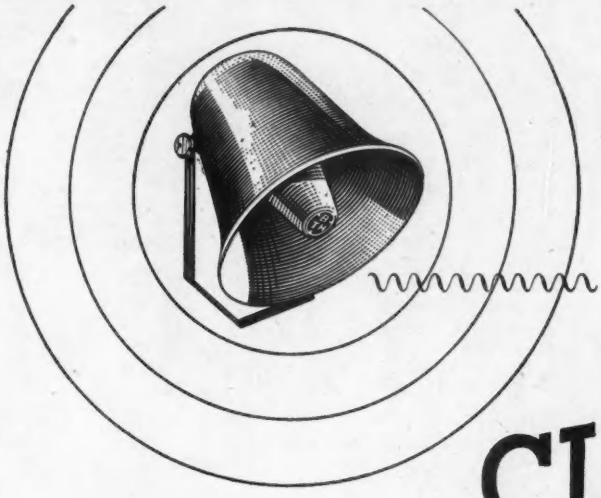

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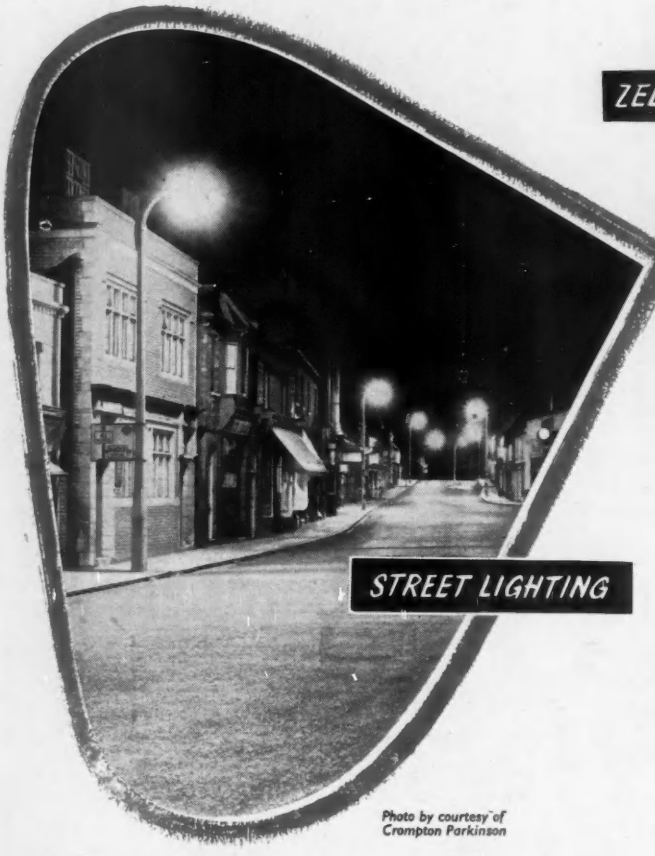

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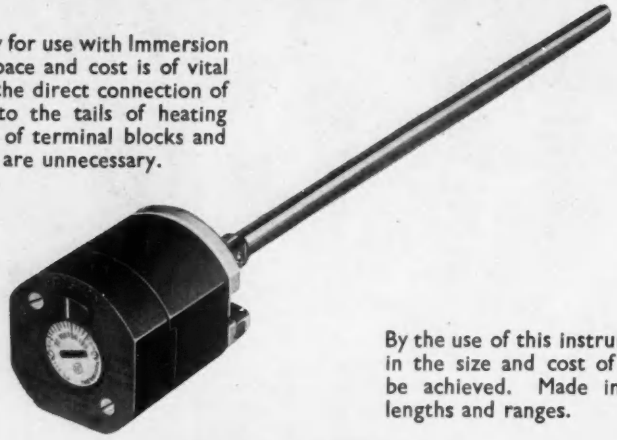

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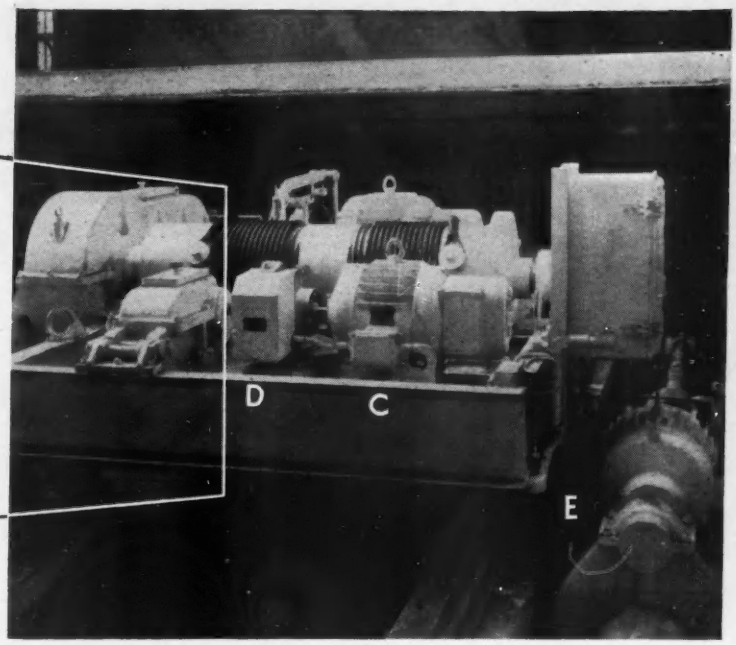
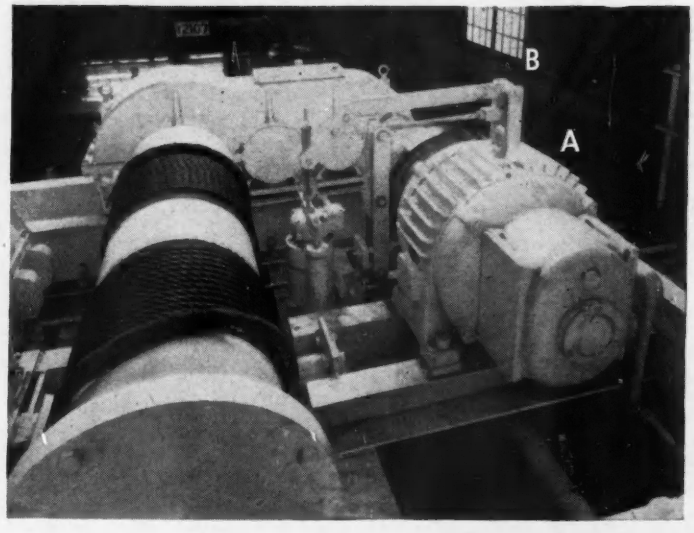


Metrovick equipment is well on top in this 10-ton Wharton overhead shop crane. The hoist is an 18-h.p. 720 r.p.m. M-V motor fitted with a thrustor-operated brake giving precise control with stable creeping speed on load. The need for inching is thus eliminated. Drives for the long travel and cross-traverse are M-V 10-h.p. 715 r.p.m. and 3-h.p. 700 r.p.m. type MZ slipring motors respectively. A 6-inch Perigrip brake operates on the cross traverse. Write for details of the range of M-V a.c. and d.c. motors, control gear and Perigrip electromagnetic brakes for crane drives.



In the illustration (left) A is the 18-h.p. 720 r.p.m. hoist motor fitted with Stacreep thrustor control B. The long-travel drive, motor E, is shown at the top of page. The 3 h.p. cross traverse motor is seen at C and the 6-inch Perigrip brake at D.

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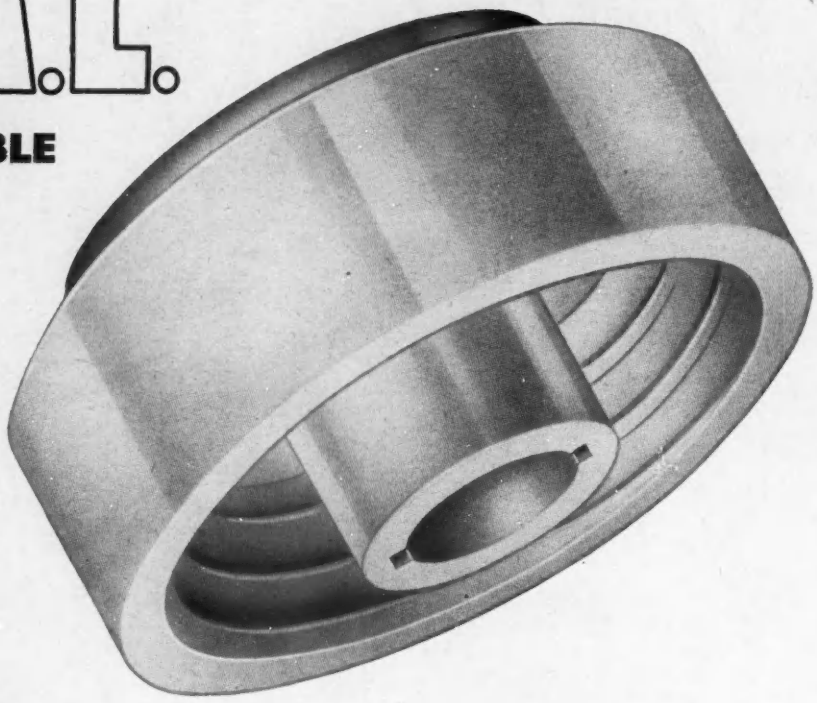

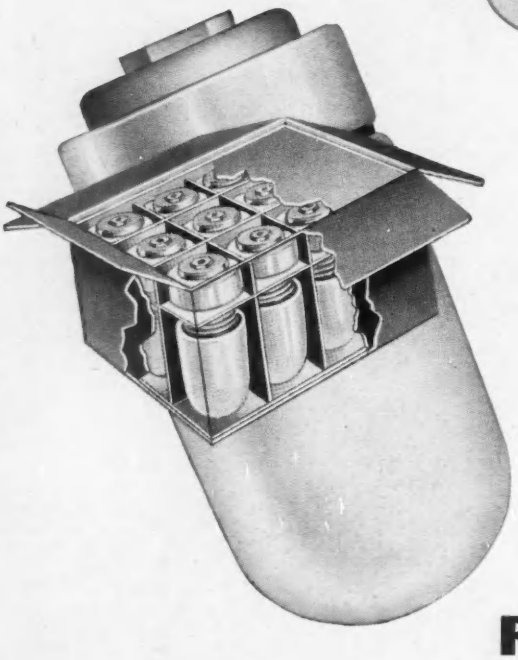

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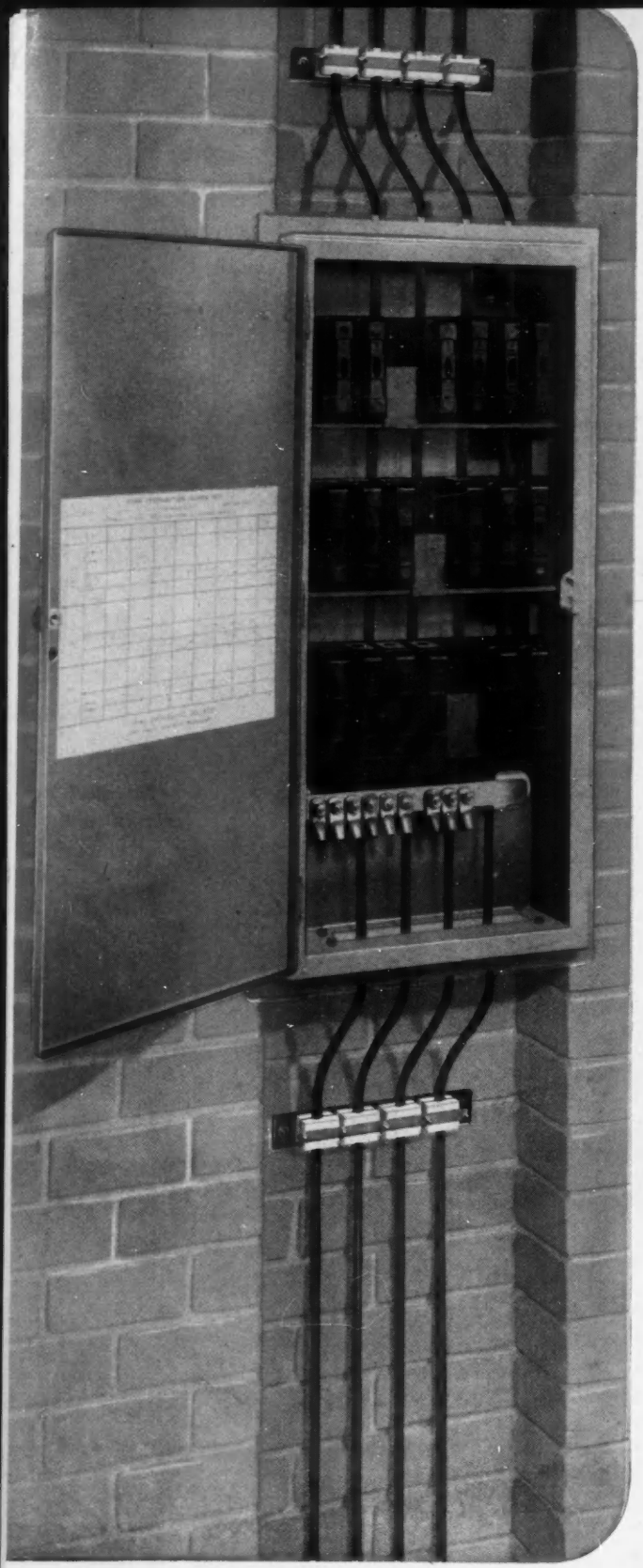

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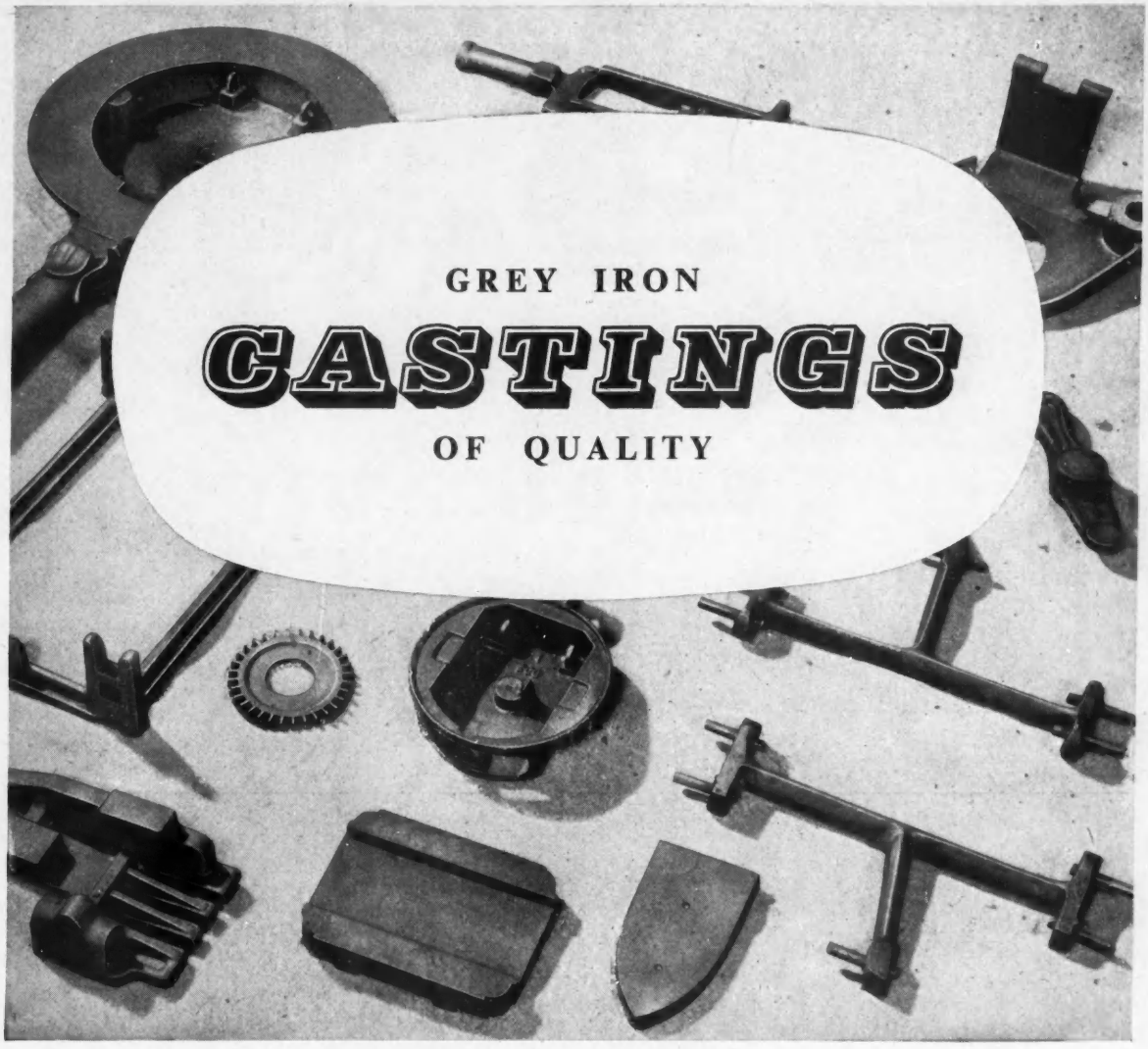

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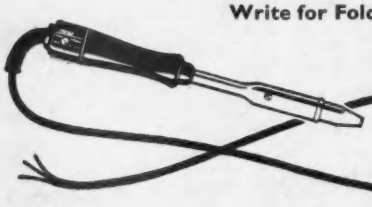

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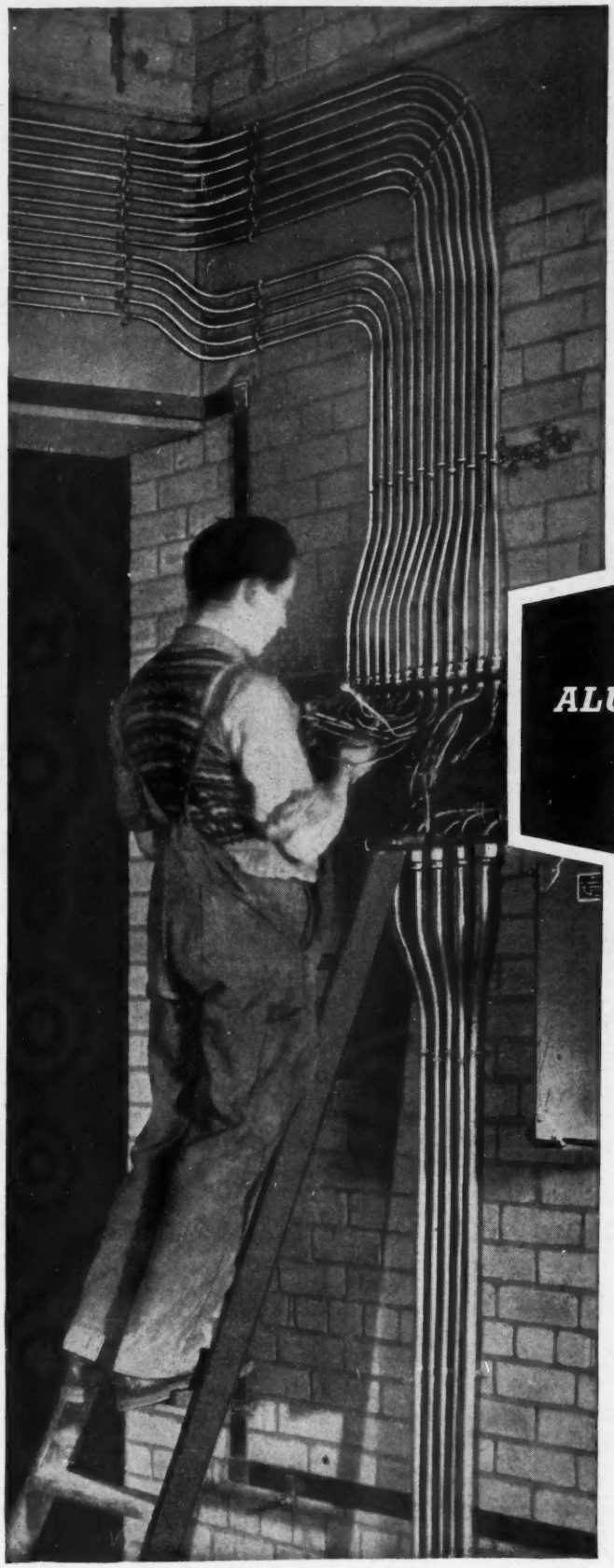

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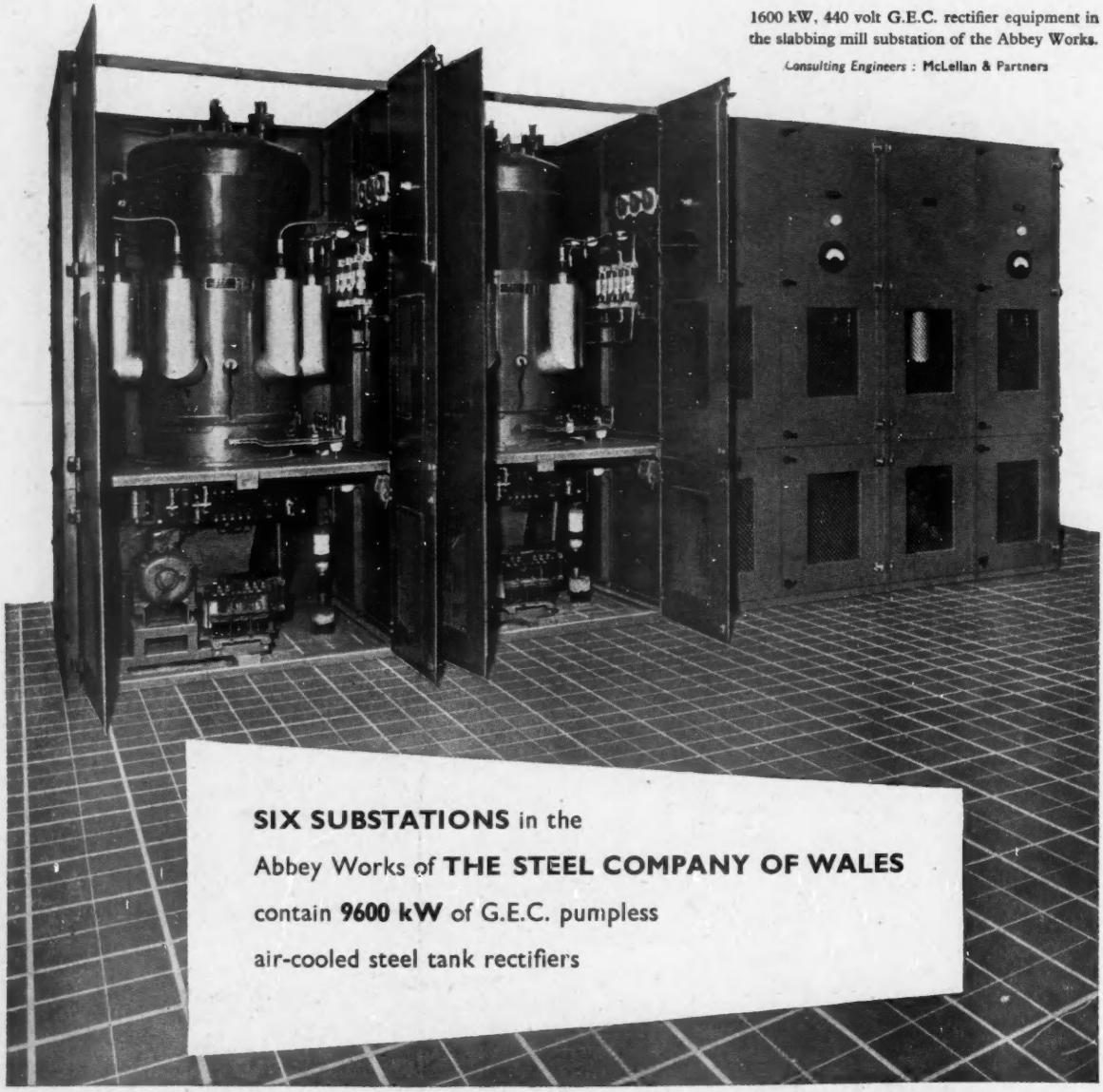

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ELECTRICAL TIMES

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CO-OPERATIVE DEVELOPMENT

One-tenth of the total research and development activities of civil industry in this country are attributable to Research Associations. In advancing this estimate in their annual report, the Advisory Council to the Committee on Scientific and Industrial Research underlines the progress made by the co-operative research movement. In 1939, annual expenditure on such work was £0·48m; by 1952, the latest year for which figures are available, the yearly outlay had risen to £4m. From such a continued investment, it is reasonable to expect large results, but although these are in fact obtained, they may not be immediately apparent to the casual observer. The D.S.I.R. Committee does well to emphasise that the success of a Research Association must not be judged mainly by the number and importance of its new discoveries and inventions. Detailed studies leading to numerous small but cumulatively significant improvements in the techniques of the particular industry involved are perhaps the most important of the typical Research Association's tasks, coupled with the advisory, liaison and propaganda effort necessary to get the improvements adopted when their desirability is established. In this last respect, there may be room for increased use of the development contract principle, whereby a firm arranges for an appropriate Research Association to carry an idea forward to the production stage, for the benefit of that particular subscriber. This is an arrangement that can in some cases overcome bottlenecks caused by an individual firm's lack of scientific staff, and it is one that deserves to be kept in mind when delays arise. There are, of course, commercial establishments that will undertake similar work, but in some circumstances, Research Association staff may be better placed.

D.C. IN THE CHANNEL

High voltage direct current transmission shows to the best advantage where relatively long cable routes are involved. This has made its consideration an obvious step in connection with the plan for an underwater power link across the English Channel. With the decision taken to lay four cables for the proposed a.c. link, the further suggestion has emerged that the fourth, spare, cable should under normal conditions be used for a trial d.c. transmission scheme, incorporating sea return of current. In noting this proposal in the course of its survey of the work of the E.R.A., the D.S.I.R. do no more than remark on the magnitude of the problems involved, and state that a "co-ordinated study" is in hand. The idea should be receiving more enthusiastic attention than this remark sug-

gests. The transmission of a relatively small amount of power between two large systems is potentially an excellent test for the new types of terminal equipment that will be involved, and the eventual outcome of such a programme, carried to a succesful conclusion, should be orders for those schemes abroad that are likely to make full use of the possibilities of h.v. d.c. in the future. The cross channel project has already shown such rewards of practical experience. The chance that its value in this direction may be still further exploited should be energetically examined. An early announcement of the favourable consideration of such a plan would give manufacturers of terminal apparatus good time to prepare for participation.

EXHIBITION FUTURE

The Electrical Engineers' Exhibition which closed last Saturday duly beat its previous records as everyone expected. Not only was the average daily attendance up by 57% but it was open one day longer than last year. There was more to see also. With a substantial increase in the number of exhibitors, a more representative display of equipment was available. More significant of the importance of the occasion was the choice of this exhibition by manufacturers to introduce new products and some were specially hurried through their final stages to be in time. With the general feeling of success in the air, despite certain features capable of improvement, it seems a reasonably safe forecast that next year will see an even larger display. Yet useful as this exhibition may be it is impossible to escape the conclusion that it does not reflect to the full the stature of the industry. The presentation is not on a scale that will win an international reputation. As we said a fortnight ago, some hard thinking needs to be done on which direction the exhibition organisation is to go. At last the electrical industry has its own exhibition, and a useful and delightful occasion it is, but is it the exhibition the industry needs to meet the present demands of trade? If not, can the industry combine to make it so?

COST AND QUALITY

Quality is something we like to associate with the mark "British Made," and it would be an unhappy day for the country if that identity became the exception rather than the rule. But that is far from saying, as Lord Mancroft seemed to in his speech at the British Refrigeration Association's luncheon, that people the world over are prepared to pay something extra for this quality. That we should avoid trying to compete with German and Japanese mass-producers and concentrate instead on fewer sales of the higher quality—and higher priced—goods is advice that must be suspect from the point of view of balance of payments, however attractive it may be in terms of prestige. With Lord Mancroft's other plea, that our salesmen should get out into the field, and that their successes in selling should be backed up by honoured delivery dates and a reliable after-sales service, there will be far less disagreement. There has been some forgetfulness in this country that these are the prime needs for successful selling. Quality must not be restricted to the product: the customer must, for full success, find it extended to all his dealings with the supplier. As we have remarked before in these columns, close attention to such details of commercial practice accompanies low prices in the activities of many of our international competitors.

POWER EXCHANGE FUTURE

Total generation of electricity by the member countries of the Organisation for European Economic Co-operation is estimated by the Organisation at 388 × 10^9 kWh in 1958 as against 273 in 1952. These figures, published in a survey last week, put the member countries taken together at the same order of power size as the U.S.A., but they show a significantly lower probable rate of expansion, and indeed the 6·2% annual rate of increase is markedly lower than the 9% recorded from 1948 to 1952. The explanation would appear to be that Europe as a whole has now caught up with its wartime lag of plant installation, and that the electricity generated during the next few years will be determined by the progress of domestic and industrial demands. The main interest in the survey—the fourth of a series—thus turns from adequacy of power supplies to the possibility of economising in new installations by the interconnection of national systems. Eight member countries are at present interconnected, and for the seven years surveyed, about 2½% of the energy that they will generate is likely to be available for export. Estimates of the requirements of importing countries are significantly lower, dropping to 1·2%. The difference, which is stated to be largely accounted for by hydro-plant, may in fact prove useful for increasing the overall European efficiency of generation, thus saving fuel, by reducing the running hours of older thermal units.

BICENTENARY OF ENCOURAGEMENT

The Royal Society of Arts comes to its bicentenary, celebrated this week, distinguished by a continued awareness of contemporary needs of the community it serves. Its foundation in 1754 was, as Sir Ben Lockspeiser said yesterday, "no lucky accident. It was made by the times for the times," and that characteristic has been maintained. In the early days medals and premiums for specific inventions were the means of encouragement offered to engineers and scientists. Later, after the success of the Great Exhibition of 1851 had offered encouragement at the first centenary of the society which had originated it, the accent changed to the present programme of lectures on technological advances, and of practical encouragement of study by means of examination boards—though the technical work which the Society originated in this field has been largely taken over by the City and Guilds of London Institute. Throughout this two hundred years of increasing though changing activity, electricity has naturally figured largely in the Society's records, and is likely to continue so, though the excitement of original announcements of discoveries has been replaced by the more staid but still valuable exercise of authoritative lectures reviewing newly established methods and machines.

Meteor

Fluorescent Lamp Development Continues

By H. R. RUFF, B.Sc., M.I.E.E., and M. G. CLARKE, B.Sc.*

Examining the coating of fluorescent tubes under transmitted light

SINCE our article in the ELECTRICAL TIMES in 1940 heralding the introduction of the fluorescent lamp, progress has been continuously maintained, as by their unremitting efforts, teams of workers have gradually gained a better understanding of the factors controlling lamp performance. At the same time the mechanised methods of manufacture introduced have been designed to improve uniformity as well as to cheapen production. The 80 watt lamp continues to be the main production line in this country; it is still the most economic unit for general lighting and has been applied successfully not only indoors but also outdoors for high quality street lighting. Some ten further sizes have been added to this range to enable the field of usefulness of fluorescent lamps to be extended to smaller buildings and to many specialised applications such as lighting in the restricted space of coal mines, in trains and in aircraft.

The introduction of the "New Warm White" and "Deluxe Warm White" lamps offers an opportunity for surveying some of the work which has been going on continuously with the object of giving the public more light for the same power, more light for the same cost (in spite of the increase of the cost of power) and also an improved selection of colours.

*Messrs Ruff and Clarke are in the Research Laboratory of B.T.H., Rugby.

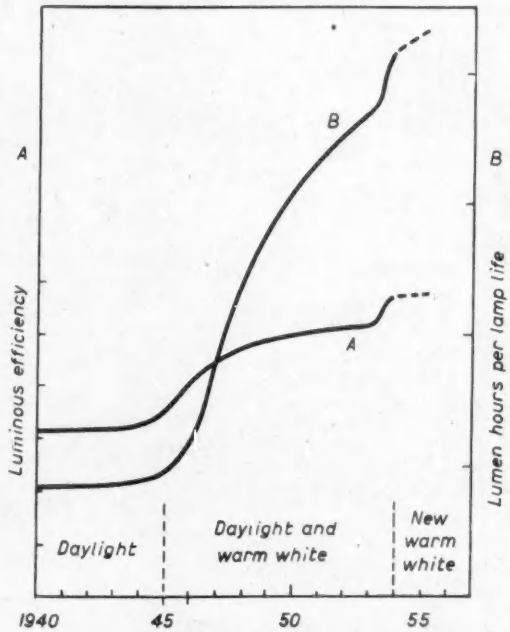


Fig. 1. These graphs illustrate the progress made in luminous efficiency and in lamp life from 1940 to the present day

Improved Efficiency and Economy

Figure 1 summarises the results of the efforts during these years made to improve lamp efficiency and to give the user greater economy. Curve "A" shows the improvement of luminous efficiency starting with the "Daylight" colour in which the lamp was first introduced. This colour is still the most popular here and has also been followed in the development work on colours in America and in Europe.

The figures plotted are the lamp efficiencies obtained after 100 hours burning; it will be seen that an improvement of nearly 100% has been achieved. The convention of measuring efficiency at 100 hours life was established in the early days when a drop of nearly 25% in efficiency was experienced after this period of burning. Modifications to lamp manufacture improved this gradually but a major advance was made in 1946 with the introduction of halophosphate phosphors and the drop in efficiency in the first 100 hours is now only about 5%. The stability of light output is very much improved not only during the initial few burning hours but also through the whole lamp life, so that full advantage can now be taken of the concurrent improvements to lamp cathode life.

Curve "B" in Fig. 1 shows the striking rise in the total lumen hours output of lamps during the same period; the present value being five times the original output.

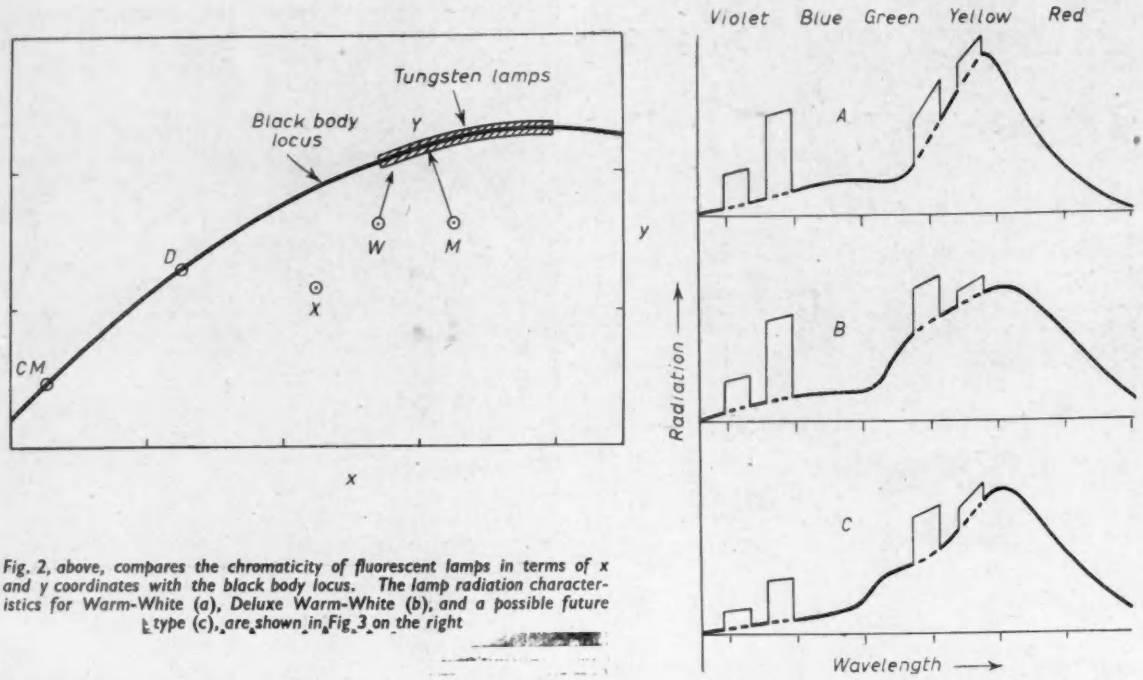


Fig. 2, above, compares the chromaticity of fluorescent lamps in terms of x and y coordinates with the black body locus. The lamp radiation characteristics for Warm-White (a), Deluxe Warm-White (b), and a possible future type (c), are shown in Fig. 3 on the right

Colour Rendering

In 1945 the "Warm White" colour was introduced having the same efficiency as the "Daylight" colour. With the introduction of halophosphates this common efficiency was maintained, and the improvements in manufacture have applied equally to both colours. Fig. 2 is a diagram which illustrates the colour appearance of practical lamps. This uses the internationally agreed system which enables the colour appearance to be illustrated graphically in terms of x and y chromaticity co-ordinates.

The way in which this can be done can be appreciated from a study of the black body locus line, which is a line joining the colour appearance points of a black surface as its temperature is raised. The "D" on this line represents the colour appearance point of the British Daylight lamp and is also very close to the appearance of natural sunlight. The point "CM" marks the colour appearance of the "British Colour Matching" lamp which simulates north sky daylight and is particularly helpful, at high illumination levels, for distinguishing small colour differences.

The shaded area shows the colour appearance points of general incandescent lamps—the maximum temperature of these being limited by the evaporation and burn out of the filament. On this diagram "W" indicates the colour appearance of the "Warm White" lamp which has now been modified slightly as shown by the arrow.

Improvements in Colour

While this diagram enables the colour appearance or chromaticity of lamps to be specified, it gives little information on the colour rendering power of lamps. The only complete specification of this latter is by means of a diagram showing either the amount of light or of radiation from the lamps at each wavelength of the spectrum.

An agreed approximation is given by measurements of the percentage of light in 8 defined spectrum regions or bands.

In Fig. 3 (diagram A) is shown a curve of radiation plotted against wavelength of the visible light spectrum for a "Warm White" lamp. The four parallel sided "chimneys" represent the visible light "line" radiation from the mercury discharge and the smooth curve, on which they are superimposed, the radiation from the phosphor coating.

To improve the colour rendering of this lamp the amount of radiation in the red region must first be increased. A number of red phosphors are now available, such as magnesium germanate and arsenate, cadmium borate, and calcium silicate and phosphate. All these have limitations of usefulness and the choice rests with individual manufacturers—providing interchangeability of colours is ensured by the 8 spectrum band specification. When the red deficiency has been made good, it is necessary to add green light to return the colour appearance to its original point,

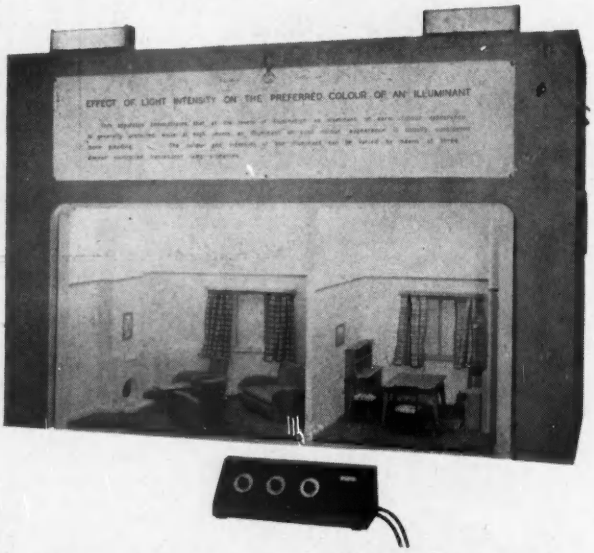


Fig. 4. This model, which has been exhibited at the Physical Society Exhibition, enables the observer to regulate various combinations of different coloured fluorescent lamps to obtain a "optimum" balance

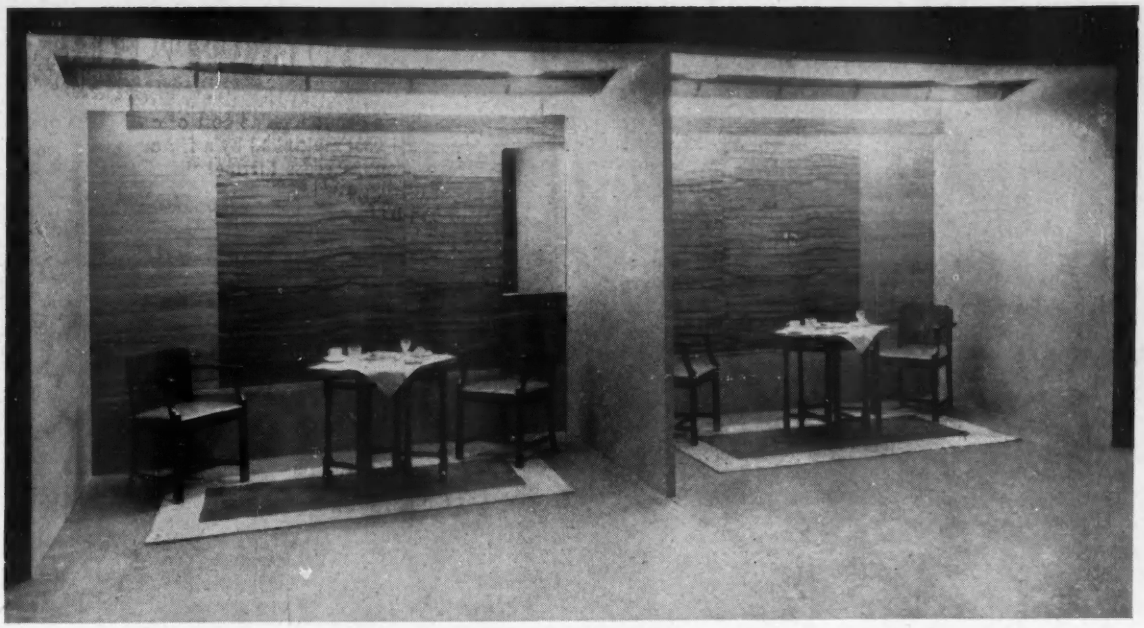


Fig. 5. The full-scale testing rooms at Rugby where fabrics, food, furnishings and other coloured objects can be examined under differing types of lighting and various schemes of decoration

and this results in a considerably broader and flatter radiation curve as shown in diagram B of Fig. 3.

This is the method by which the improved colour rendering of the "Deluxe Warm White" lamp has been obtained. It must be noted however that this gain must be accompanied by a reduction in efficiency as more of the total available radiation is shifted to regions of the spectrum which have low visibility. Also the use of more expensive phosphors and manufacturing techniques mean that the cost of this lamp is greater.

Diagram C in Fig. 3 illustrates a possible improvement which can be obtained by reducing the radiation in the two violet lines given by the mercury vapour discharge. Reduction can be affected by colour filters but this results in loss of efficiency, and interesting experimental lamps have been made in which some of the radiation is converted by a second fluorescent layer into useful light at a preferred wavelength. Diagram C shows the result of the use of a barium phosphate phosphor in this way.

Subjective Tests

In all this work on radiation characteristics of lamps we have found it helpful to obtain a subjective assessment of the attractiveness of experimental lamps. Our early investigations showed that at lower light intensities "warmer" colours are apparently preferred. Fig. 4 is a photograph of an exhibit shown at a recent Physical Society Exhibition. The two model rooms were illuminated by light of the same colour obtained by mixing the light from three different coloured fluorescent lamps using suitable dimming circuits. When the light intensity was changed from 50 ft candle to 5 ft candles observers could readjust the colour balance to obtain the nearest approach to the effect of the high intensity and in practically all cases a slightly "warmer" colour light was preferred. The two model rooms with their different furnishings also afforded an interesting example of the effect of decoration on the apparent warmth of the light.

Before new lamps are introduced in this country tests are carried out in many places to determine the preferred colour. In the Research Laboratory at Rugby the equipment used is shown in Fig. 5. It consists of two rooms in which the decoration can be modified at will and in which some four people at a time can sit for periods of approximately 5 minutes to become accustomed to the colour and can examine fabrics, food and complexions and then give marks for the rendering of each group.

These selection tests have indicated that a good colour balance is necessary for general approval and in one test it was interesting that lamps shown as X and Y in Fig. 2 both had approximately an equal number of supporters. Lamp Y was the one in which the mercury violet lines had been modified so that the lamp had a colour appearance similar to that of incandescent filament lamps.

As soon as other incandescent lamps were introduced there was a strong preference for a lamp that could be used in a combined installation of filament and fluorescent lamps in such a way that one was unconscious as to which source was supplying the light at any point. The "Deluxe Warm White" lamp which is similar to lamp Y but made using a special mixture of phosphors is introduced to fulfil this need.

ELECTRICAL ENGINEERING AFLOAT

MARINE electrical engineering was the subject of a discussion organised by the Utilisation Section of the I.E.E. last week. Its principal theme was the training and responsibility of such men. In particular, concern was expressed at the difficulty they experienced in securing promotion, and one speaker gave this as one important reason, together with lack of status, that accounted for a turnover in senior electricians of 20% per year.

In spite of some doubts expressed about the standard of electrical maintenance at sea, the general feeling was that this was satisfactory under the present arrangement, which made it the responsibility of marine engineers. Although there was no question that the chartered electrical engineer had an important place in the design and supervision of electrical equipment for ship installations, there was considerable doubt as to the need for such engineers afloat, except in the largest passenger vessels.

NOMOGRAM FOR THE B.E.A. BULK TARIFF

THE revised tariff for the supply of electricity by the Central Authority to the Area Boards recently announced by the B.E.A. (ELECTRICAL TIMES, 7th January, 1954), and which comes into operation on 1st April, must be of interest to many. In studying such a tariff, it is frequently of assistance to express actual load conditions as a flat rate cost per unit when the effect of possible variation in the maximum demand, kWh consumption, and the price of coal can be more readily appreciated.

The brief details of the tariff are as follows: Fixed Charge: £4. 15s. per kW of M.D. Running Charge: 0·5 pence per kWh, plus or minus 0·00065 pence per kWh for each penny variation in the cost of coal from the basic price of 60 shillings per ton. The cost of coal to be taken shall be the actual cost multiplied by a factor of 11,000 and divided by the average gross thermal value of the coal in B.T.Us.

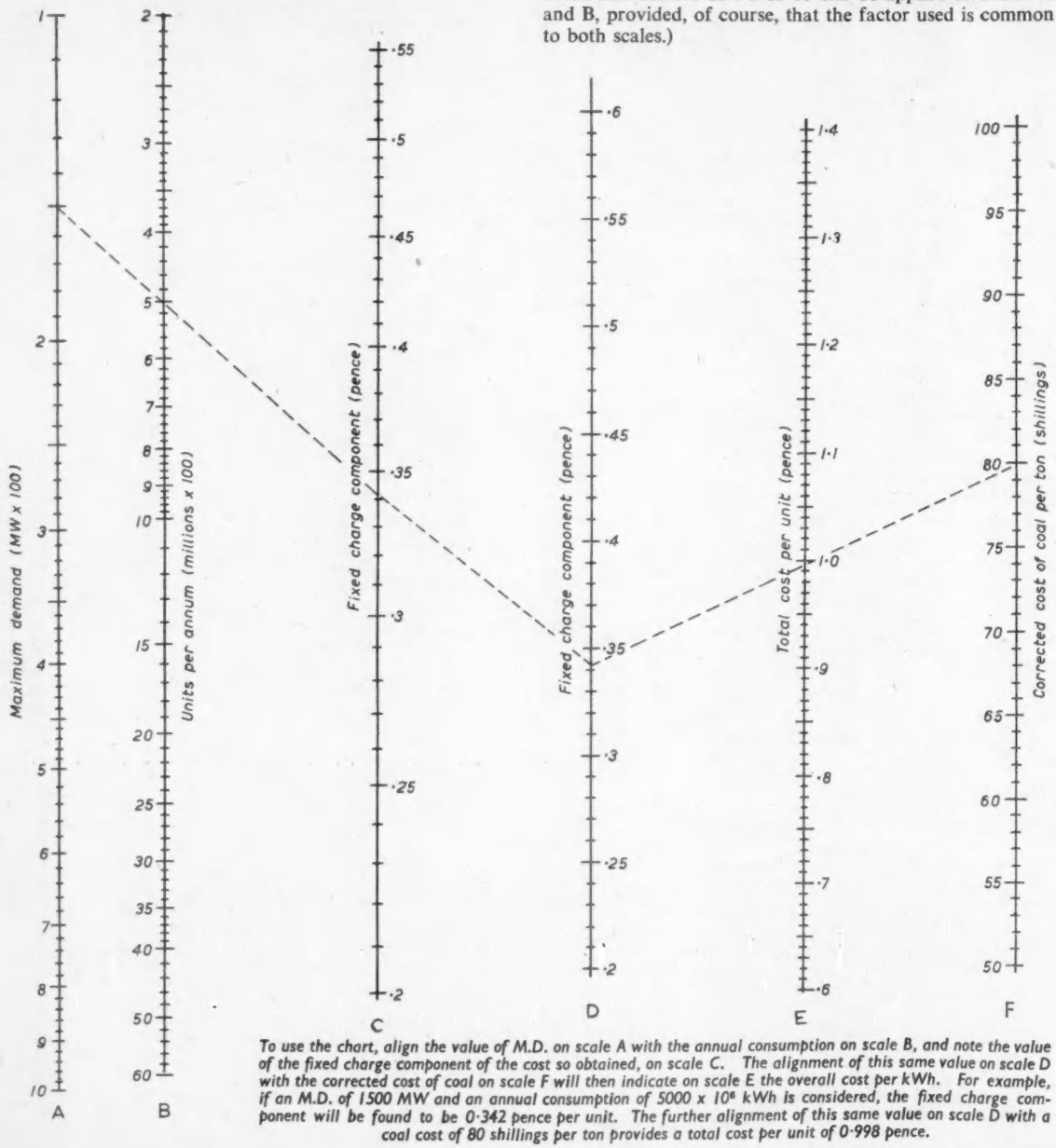
The tariff can be expressed by the following equation:—

Total cost per kWh =

$$\frac{\text{M.D.} \times 4{\cdot}75 \times 240\text{d.}}{\text{Annual Consumption (kWh)}} + 0{\cdot}5\text{d.} + 12\,(\text{P} - 60)\,0{\cdot}00065\text{d. per kWh.}$$

where P is the corrected price of coal per ton as defined above.

The nomogram illustrated solves this equation within a wide range of load conditions and a coal price ranging from 50 shillings to 100 shillings per ton. (It should be noted that factors of 0·1 or 10 can be applied to Scales A and B, provided, of course, that the factor used is common to both scales.)



To use the chart, align the value of M.D. on scale A with the annual consumption on scale B, and note the value of the fixed charge component of the cost so obtained, on scale C. The alignment of this same value on scale D with the corrected cost of coal on scale F will then indicate on scale E the overall cost per kWh. For example, if an M.D. of 1500 MW and an annual consumption of 5000 x 10^6 kWh is considered, the fixed charge component will be found to be 0·342 pence per unit. The further alignment of this same value on scale D with a coal cost of 80 shillings per ton provides a total cost per unit of 0·998 pence.

Adamjee Jute Mills

PART III:— ELECTRIFICATION IN PAKISTAN: BY H. M. NIMMO, M.SC., B.E., A.M.I.E.E.

THREE 1,000 loom jute mills have been erected in the Narayanganj area of East Pakistan, as part of a project to absorb the country's non-exportable surplus of raw jute. The electrical planning and installation work involved has been described in previous parts of this article.* This final section describes the steps taken to secure a temporary supply of electricity.

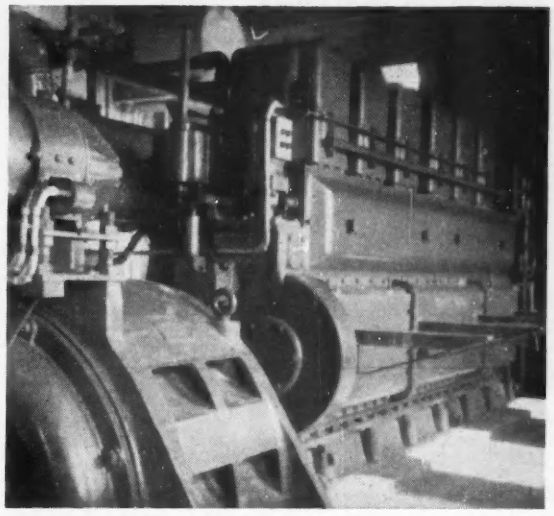
Supply Shortage

One jute loom running 16 hours a day would produce a gross profit of about £5 per day. Diesel engine power plant could be installed at about £40 to £50 per kW for the type of plant which is now under contemplation so that a total capital expenditure on power plant of at most £150 would permit a gross profit of £5 a day if the process plant would otherwise for lack of power be required to stand idle. It was, therefore, well worth while to install any sort of plant available if it would run for more than 30 days. In the period which had elapsed until the last of the three engines mentioned in the last paragraph was running, a great deal of progress had been made in mill building and by August, 1953, the requirement of the mills for power had risen to about 4,500 kW so that the contribution of some 2,600 kW from the Deutz engines was very short of providing the whole power required. As might have been expected, the contribution of Dhakeswari Cotton Mill to the power requirement was not conspicuously successful. After the middle of 1952, when the l.p. end of their turbine was partially rebladed, it was possible to get as much as 1,600 kW from this source when the boilers were simultaneously serviceable, but their condition was so bad that they could not both be kept serviceable for prolonged periods. No effort was therefore spared to obtain alternative sources of power.

Medium Voltage Power Plant

All the power plant so obtained generated at 440 V and the first to be installed was a group of four General Motors two stroke engine sets of 75 kW each. These machines were radiator cooled and very simple to install, and had been ordered by the Government to provide temporary power supplies for isolated areas. Their control panels were not provided with wattmeters and they proved very difficult to control. In any case at the time of their installation the mill was capable of consuming about 1,500 kW, and if an attempt was made to run them by themselves, their intrinsic regulation was so high that the starting of two 15 h.p. motors more or less simultaneously was enough to cause a serious disturbance in the voltage of the four sets running in parallel, resulting in uncontrollable circulating currents and the sets falling out of step. However, by running them in parallel with Dhakeswari Cotton Mill, it was possible to obtain a useful load from them.

In the writer's opinion, this class of machine is not suitable for continuous operation at high load. The machines are not provided with cylinder exhaust thermometers, and hence the failure of the injection system of one cylinder has the immediate effect of overloading the other cylinders, since the driver will be unaware that the change of load on the set has not been produced by a slight change of speed of other sets running in parallel, and he will correct the governor control back to the standard load reading. Another difficulty which was peculiar to the locality, was extreme difficulty in obtaining spares, and there was always a shortage of such consumable spares as fuel filter elements. These machines were installed in the early months of 1952 and went successively out of service due to bearing breakdown of the blowers fitted for scavenging and supercharging. By the end of 1952, only one of these sets would run—it would be wrong to describe it as serviceable—and spares to restore them to serviceability were unobtainable.



The 600 kW diesel-alternator set used for temporary supplies

Further Extensions

Six more sets of this type were purchased by Adamjee Jute Mills and put to work towards the end of 1952. These each comprised two engines driving through clutches and gear box, a 250 kVA alternator, and the combination was rated at 175 kW each. These sets suffered from most of the defects found in the single engine sets as well as some peculiar to themselves, but they did not develop the blower defects which had put the others out of service, and in consequence were good for about 600 kW when the writer left in October, 1953.

Two more l.v. sets were purchased in 1952 and put into service in 1953, one 600 kW Worthington-I.C.E. set, originally purchased for service in Shanghai and abandoned in Hong Kong for about three years, and a D.K.W. set of 250 kW which was purchased in East Pakistan, having allegedly been works reconditioned in Germany. These were both good sets eventually, but the complete injection equipment of the Worthington set was unserviceable when received, and with regard to the D.K.W. set, all that need be said is that the D.K.W. works in Kiel where the engine was built had been completely destroyed by bombing during the late war.

**Page 195 of 11th February, 1954, and page 353 of 11th March, 1954.*

Remarks on Diesel Engine Operation

The operation of these diesel engine sets brought to light several very important points. Fuel supply at the mills was always difficult. The fuel came by tanker to Chittagong and there were no tank barges available to forward by water to the mills. There was no road or rail connection to the mills and so it was necessary to empty the tank wagons into drums for onwards water transport to the mills. It was unbelievable how much contamination of the oil fuel arose from this cause. Light diesel oil, which was the fuel used for all except the small high speed sets, was filtered on site in a filtration plant which had been ordered as soon as it appeared that the diesel engine installations on site were more than the most temporary expedient, and the filter was a De Laval set of 200 galls/hour capacity. Using oil supplied in drums as described above, the filter could not be run safely for more than two hours and would then usually be found completely clogged with solid matter. Microscopic examination of this solid matter was interesting and showed the presence of coal, coke dust, jute and cotton fibres, brick dust and sand. Undoubtedly a considerable amount of this would find its way into the engine and some of it did undoubtedly find its way into the injection equipment.

Atmospheric Pollution

A second point of importance concerns the engine installation itself. It might be supposed that in a green country like East Bengal especially since there is so much water about, the air would be reasonably free of dust and it would be unnecessary to filter the air supplied to the engines. This is, however, far from being the case, and most of the impurities mentioned above as polluting the fuel, also pollute the atmosphere. Few of these substances really improve engines when introduced into the cylinders, and very rapid wear of cylinder liners and piston rings will take place if the air is not filtered. It is also of importance to take the air from outside the engine room, because the normal high atmospheric temperature is increased by stray heat losses from the engines so that it may easily reach 120° F. Air taken in at such a temperature of course results in a considerable reduction in the power output of the diesel engines.

Conclusion

The story of the building of these mills which is one of the biggest industrial undertakings to be commenced in India or Pakistan since the war is the story of a continual struggle against serious physical obstacles, against world-wide shortages of materials and against an almost complete absence of all normal supplies and traditional skills which are tacitly assumed to be present when projects of this magnitude are being planned. That this undertaking is succeeding in spite of all these obstacles, is creating modern industry where modern industry never existed, is providing new wealth in a province which has traditionally been one of the most backward in the Indian peninsula, is a tribute of no mean order to the faith that the people of this new nation of Pakistan have in their country and in the future that stretches before it.

(Concluded)

E.W.F. President on Price Cutting

ATTENTION to the growing practice of price cutting was drawn by the President of the Electrical Wholesalers Federation, Mr E. A. V. Peckham, in replying to the principal toast at the Annual Dinner last week. It is becoming increasingly difficult for the honourable trader to hold business without departing from what the industry has agreed is proper trading. Particularly, he referred to quantity buying terms and asked that where they are allowed by any manufacturer they should have an inflexible basis of operation and must be freely published to all entitled to take advantage of them. Another major cause of price cutting at present is the over-abundance of certain commodities, particularly wiring accessories. Wholesalers can only be really efficient if they handle a reasonable amount of business. Not only are there new entrants to reduce the size of the individual slice but manufacturers are maintaining their own branches, competing with the wholesaler.

Top table with Sir John Dalton, Messrs A. B. Wildsmith, W. J. Brown, E. A. V. Peckham (President) and J. Eccles

One important manufacturer has recently closed three provincial branches for the reason that the capital involved can more usefully be employed in production. If all manufacturers' branches had to operate at a profit or close down, more would follow this lead. Makers should also consider carefully before granting discounts in excess of trade discounts to any one who happens to make up his mind that he will set up as an electrical wholesaler. The President said we were all in the electrical boat together and we should start a crusade now to bring home to each other the fact that maintenance of recognised practices is not only right and proper but eventually it pays dividends.

The toast had been proposed by Mr W. J. Brown in his inimitable style. It is time the country acknowledged the value of profit, he said. If you made one you were a profiteer, if not, it showed how inefficient was private enterprise. Wholesaling was a good honest racket and there was no need to be ashamed of it. Mr W. Crisp's toast to "The Guests" was a model of how this difficult subject should be handled and Mr A. F. Plummer, in replying, displayed all the attributes of an after-dinner speaker. This unusually high level of speeches combined with an excellent programme of entertainment to make a most enjoyable evening.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Ring Circuits

I WOULD hasten to assure Mr Christian (Readers' Views, 18th March) that I have not lost my punch nor am I shadow-boxing; and I am not losing my "ring" craft!!! The small marks at either side of the words "ring main" are inverted commas and are put there for the sole reason of drawing attention to this widely used expression.

With regards to the remarks on the inexperience of architects I shall leave them to answer that criticism.

I would be only too pleased to comment on the wiring in housing sites but time does not permit me to do so at present. Private enterprise does not allow one too much time these days!

"Megohm."

* * *

I THINK Mr Christian is a little unfair to "Megohm." If, as he states, "the ring circuit principle of wiring using 13-ampere shuttered socket-outlets was developed to provide an adequate number of socket-outlets at reasonable cost, rather than to save money on the average electrical installation," surely he cancels his own objection. The fact is, that the householder obtains a better installation at the same price, and is saved the expense and trouble of having extra socket-outlets installed after the main wiring is completed.

For the same final "adequate" installation therefore, the ring circuit system should ensure a cheaper initial cost.

S. M. Reed,
BECKENHAM, KENT.

T.V. and Lightning

HAVING read the contributions to "Readers' Views" on the subject of TV and Lightning, I took the trouble to have a look at the back of my own television receiver. As far as I can make out there is no earth, nor is there any provision made for attaching an earth. The set is an a.c./d.c. type and the aerial lead-in twin wire. Under these circumstances, the provision of a Metrosil LV surge diverter would imply, in addition to its initial cost of about £1, the running in of an appropriate earth lead.

I do not know the statistical probability of being hit by lightning, nor have I any personal experience of anyone who has suffered in this manner, but to me it appears that the event is comparatively rare, and I am consequently prepared to take the risk of no protection.

"Looker In,"
ISLEWORTH.

Refrigerator Problems at Home and Abroad

OUTLINING a three-point plan for British manufacturers exporting goods in competition with other countries, Lord Mancroft, M.B.E., T.D., stated that the Refrigeration Industry exported equipment to the value of £13 million during 1953. The occasion was the B.R.A. Luncheon at the Connaught Rooms last Friday when Lord Mancroft proposed "The British Refrigeration Association." Although, he said, the industry's exports were likely to better that figure in the present year, he pointed out that the country had to import 67·5% of its food. The best way to pay for those imports was to sell goods abroad at the right time, the right place and at the price the buyer was prepared to pay.

Goods Must be on Time

It was, he stated, of no value to try to sell goods after the contract date, nor could exporters hope to sell articles to overseas buyers unless they guaranteed delivery to the buyers' requirements. Obviously customers want goods only on the date and at the place contracted. Where price was concerned, Lord Mancroft felt that overseas buyers were prepared to pay a little more for the best quality, and he considered the latter synonymous with British products. There was nothing to fear in competition from abroad provided Britain made the best machinery and gave the best service—the little extra in the price was not then important. This country, however, could not hope to compete in mass markets but had to look for new grounds on which we could challenge all competitors.

In reply, Mr E. G. Batt, director and secretary of the Association, brought his audience's thoughts nearer home by the comforting news that the decline of 1952 had not only been reversed but that the Association had fully recovered its position, including the maintenance of the exports percentage. This news, he stressed, gave no room for complacency. The industry was facing world competition, including Germany and possibly Japan as well in the near future. Increased productivity was still essential, and the best results could only be achieved by co-operative action, research and standardisation on the producers' part. In this respect, Trade Associations played a useful part, and it was only to be regretted that those critics who saw nothing but wrong in these organisations do not inform themselves of such bodies' achievements.

Looking briefly at the Association's work during the year, Mr Batt regretted that greater use was not made of their National College, particularly so in view of the likely future shortage of technically trained men. During the College's life of eight academic sessions, the industry had nominated but 34 students. He felt that the industry should try to achieve the situation in which the College would be able to pick and choose to find the best type of student for training instead of going cap in hand begging for nominees. On the thorny subject of purchase tax, Mr Batt expressed his disappointment that the Chancellor could foresee no reduction. Moreover, the new position wherein purchase tax changes could be made at any time, now resulted in perpetual uncertainty of tax paid stocks in retailers' hands. For H.M. Customs and Excise to say that goods could be sold on a "Sale or Return" basis was no answer as this form of trading was the worst possible. In conclusion, he expressed disturbance at the shortage of sheet steel, a position which may lead to curtailment of production. It seemed to him that the Government should first ensure that the needs of the Home market were being satisfied before exporting sheet steel.

In the concluding toast to the Chairman, Mr N. F. T. Saunders, the proposer, and the Chairman, Mr R. H. Hemmings, in reply, both talked of purely domestic matters. The latter's speech, however, was the occasion of warm tributes to Mr Batt who is shortly retiring from his position as Director and Secretary and the presentation to him of a television set and pieces of antique silver.

Research Association Progress

RESEARCH activities of the establishments of The Department of Scientific and Industrial Research, and of the Research Associations receiving grants from that source, were as varied as ever in the year ending 30th September, 1953, and the thick Report on them which was published last week is correspondingly varied in content. Thus the full detail of the work it briefly surveys must await the publication of the reports of individual establishments. Here it is possible only to glance at the broader issues of the year.

Important amongst these was the attention given to the Research Associations. The 21 grant-aided associations which were operating in 1939 have expanded to 41, and the grants administered by the Department from £0·18m to £1·3m in the same period. It is still felt, however, that there is need for the substantial expansion of many of the existing associations, and for the creation of a number of new ones. Expansion is implicit, indeed, in the capital grant of £100,000 authorised to be made to the E.R.A. for new laboratories at Leatherhead.

It was during the year under review that the Government's Advisory Council for Scientific Policy made a report on the exploitation of science by industry, and the Advisory Council of D.S.I.R. notes with pleasure the remarks made therein on the value of Research Associations. It is recalled that the present activities of Research Associations account for about one-tenth of the total research and development activities of civil industry. This means that many of the Associations, especially those connected with the larger and more scientific industries, apply much less direct effort to research and development than do their individual members, collectively in their own laboratories and factories. It is doubtful, however, whether the use made of the knowledge supplied by and through an Association is as widespread as it should be. This is a topic which Research Associations have to keep continuously under review, and various techniques are available for securing an improvement. One of the best is by special liaison and advisory services which ensure that member firms receive not only documentary information, but also visits by experienced officers of the Association who can advise on the firm's technical problems, and how best the Association's scientific knowledge can be applied to solving them.

In this connection the present report emphasises that the worth of a Research Association is not to be judged only by the number and importance of its "discoveries" and "inventions." A steady flow of small improvements secured in an industry by the efforts of an Association, often has a great cumulative effect on efficiency.

E.D.A.'s 1954 CAMPAIGN

CONTINUING on the basic slogan, "Electricity a Power of Good," the 1954 E.D.A. Advertising campaign emphasises the benefits that electricity can confer on the young couple, setting up house for the first time, the married couple who have attained the status of house owners and the man who works at home.

The campaign is being supported by half-page advertisements in the popular national daily newspapers; by full-page advertisement in the *Radio Times*, and by full colour advertisements in the popular weekly magazines and in the big circulation women's magazines.

For Electricity Service Centres there are double crown posters and also showcards illustrating the main themes. An unusual innovation is a "3-D" display medium consisting of a stereoscopic viewer with which is associated a set of twelve slides to give coloured "3-D" renderings of modern kitchens with electric cookers, water heaters, refrigerators and washing machines.

Film Releases

Two new promotional films will be released during the year; they are both in colour, and will be available in 16 and 35 mm versions. One of these deals with "Kitchen Planning," and runs for 15-20 minutes, the other is on "Electric Cooking." This second film is frankly promotional and centres around a cookery demonstration in which Marguerite Patten takes the part of the demonstrator. "Boiling and Simmering" is a recent E.D.A. film in which Philip Harben shows how to make the best use of electric boiling plates.

The sub-theme of the whole campaign is "The Four Foundations of Modern Living"—electric cookers, electric water heaters, electric refrigerators and electric washing machines. These four foundations are included in all the advertisements and other material supporting the campaign, and three-colour stickers and "mobiles" are available using this theme.

As Mr V. W. Dale points out in his introduction to the booklet illustrating the scope of advertising: "In the year 1953, E.D.A. was able to direct attention to domestic electric cookers and water heaters in a fairly large number of national magazines . . . This brochure introduces another very welcome advance—a full-scale domestic campaign for the year 1954."

One of the illustrations in the Advertising Campaign

The Batti-Wallahs Ladies Night

Mr A. G. Freeborn and his daughter, Mrs Downham, receiving Mr and Mrs C. B. Cleland (above). On the right Sir John and Lady Hacking, and below them, Mr and Mrs W. J. H. Wood, Mr Robertson, and Mr N. D. Cloran

(Above) Mr and Mrs A. H. Hughes chat with Mr and Mrs H. D. B. Wood. (Right) Vice-Admiral Raw and Rear-Admiral (L) Sir Philip Clark with their ladies. (Below) The W.T. Henley party, pictured here, included Sir Montague Hughman

Performance of Servo-Mechanisms

Methods of Analysis Reviewed at I.E.E.

THE question of criteria for evaluating the performance of servo-mechanisms has been particularly difficult of theoretical analysis. One of the latest proposals put forward by DR J. H. WESTCOTT last week in a Measurements Section I.E.E. paper, was that the best evaluation was that based on the minimisation of the time moment of the error-squared in the response of the system to any specified input system. The criterion was comprehensive, and depended on the complete error transient; it was also related to the minimum-integral-of-error-squared criterion which had been previously proposed. The paper developed a mathematical analysis comparing the two criteria, but admitted that considerable work was necessary is the application of the method. It shows, however, that this new criterion based on minimum moment-of-error satisfies the requirements for the case where design of simple types of servo-mechanisms is to be specified empirically to ensure the best practical results. Moreover, it recommends that the time-weighted criterion be adopted for the design of special-purpose systems where empirical requirements are not necessarily appropriate.

A second paper by DR J. C. WEST and P. N. NIKIFORUK, presented at the same meeting dealt with the class of control systems where the amplifier had a non-linear amplitude characteristic classed as the "hard-spring" type. The work on this was carried out by means of an analogue computer which simulated the behaviour of the system. Results were obtained for transient, steady state and frequency responses, the work showing that despite discontinuous jumps in the gain/frequency-response characteristic, the transient responses display no abnormal behaviour. The non-linear simulator was stable for all input conditions. Moreover a method used earlier for predicting the frequency response of a servo-mechanism embodying a non-linear amplifier of the "soft-spring" type may also be used to predict the response of a system having a "hard spring" characteristic.

DISCUSSION

The discussion was opened by PROF C. HOLT SMITH (Military College of Science) who was not particularly impressed by Dr Westcott's analysis. He thought alternatives to the moment of error-squared could be easily devised and stated that modulus of error, root modulus of error, and the total time for which the error exceeded some predetermined value all reduced the relative contribution of the larger errors. MR R. H. MACMILLAN (Cambridge University) said he felt some doubt about all the minimum criteria based on an arbitrary step input, and MR P. H. HAMMOND (R.R.E.) illustrated a construction for predicting the jump phenomenon which he thought had some slight advantages over the construction used by the author. MR GRENSTED (Cambridge University) stated that they had done a considerable amount of theoretical work on non-linear feedback control systems and had used the same approximation as the authors. MR J. F. COALES (Chairman) agreed with Dr Westcott that inertia was unavoidable, but did not think that its effect was as important as was made out in the paper. MR J. P. CORBETT suggested that it was neither necessary nor desirable to have one criterion, and MR J. K. LUBBOCK said that the labour involved was one of the reasons why Dr Westcott's method was not used in practice. MESSRS R. C. STEEL, G. ELLESWORTH and J. J. THOMPSON also contributed to the discussion, to which the Authors briefly replied.

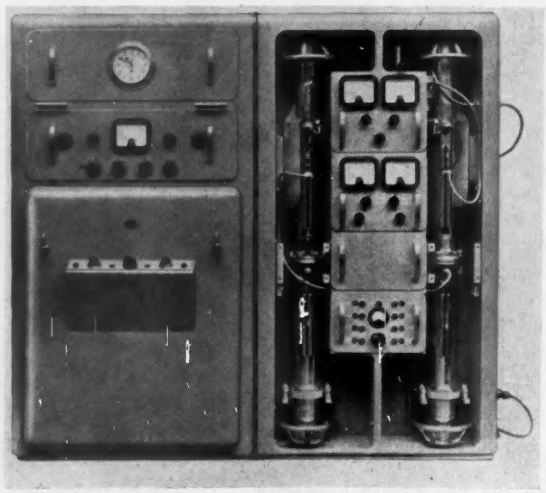
Toward Higher TV Frequencies

B.B.C. Order Test Transmitters for Bands III, IV & V

EXPERIMENTAL work on frequency bands III (174-216 Mc/s), IV (470-585 Mc/s) and V (610-960 Mc/s) is to be carried out in the near future by the B.B.C. The tests will be conducted with the aid of six special transmitters, now under construction at the Mullard Research Laboratories, Redhill, Surrey. These transmitters are most unusual in that they have a remarkably wide frequency range, two of them each covering from 174 to 265 Mc/s, two similarly covering 470 to 600 Mc/s and two 600-960 Mc/s. The requirements for them were particularly stringent. They had to be capable of transport by lorry, to operate off mains supplies liable to variation of +5 to −15% at nominal voltages of between 200-250 V a.c. and with frequencies of 45 to 55 c/s, and to be safely operated by semi-skilled personnel.

Normally the transmitters will be square wave modulated, as by this means, coupled with a high order of transmitter frequency stability, it is possible to use narrow band receivers of extreme sensitivity. The signals, at a fundamental modulation frequency of 1,000 c/s will be extracted in the receiver by means of filters. The output of the transmitters can therefore be made comparatively small, the actual figures being (on square wave) 600 W peak for Band III, and 400 and 200 W peak for Bands IV and V respectively. Pulse modulation can also be applied for investigation of multi-path transmission and echo effects. Under these conditions a pulse of about 15 to 18 kW is available at a p.r.f. of 1,000 c/s, the duration of the pulse being about 0·5 microsec.

Only one r.f. circuit is used for both pulse and square wave-form conditions of modulation, and this has been achieved by using variable length, co-axial resonant lines for the output, the preceding and, in some instances, the earlier stages. A clock is also provided so that timing and identification signals can be automatically transmitted.



Television test transmitter with r.h. cover removed to show tuning section

notes on wiring

by Megohm

IN common with many other members of the electrical industry I made my way towards Earls Court on Tuesday last. Once through the turnstiles I felt completely at home as I first of all took a casual walk down the rows of stands. I lost count of the number of friends smiling at me from behind the rows of switches, switch-sockets, cable and conduit fittings. There was much to interest all and no lack of enthusiasm by the people in charge of the stands.

Plaster Depth Boxes

A number of manufacturers were displaying boxes suitable for housing flush type switches, and of such a depth that they can be set flush with the wall by merely removing the plaster. These are mainly intended for use with "grip" type conduit systems, although entries for t.r.s. cable and screwed conduit are available. I feel that the most suitable type of conduit to use with these boxes is the oval type, as this can also be concealed in the thickness of the plaster. This is not a new type of box by any means, but I think that it is worthy of comment, if only to emphasise that where t.r.s. cable is being used either in new or old buildings, and chasing of walls must be kept to a minimum, here is an inexpensive method of concealing and protecting these cables. The easy renewal of cables in the future is assured.

One of these manufacturers was displaying back to back switch or socket boxes which, to my way of thinking, should prove to be popular with contractors. It is not always an easy job to couple two ordinary switchboxes together at a back to back position and I always have grave doubts as to the efficient bonding in such an arrangement. This doubt vanishes with the purpose-made box, as it is fabricated in the form of a complete unit.

It may seem strange that the ordinary hooked backplate should come in for praise, but I saw one which I thought worthy of some. It was a combined dome cover and hook, with the hook offset from the cable exit. Perhaps many people may not think that this is very important, but I have seen some very bad cases of kinking in flexibles due to the hook not being so arranged. This is very much in evidence where rubber covered flexible is used. The flexible used with this new type of hook drops straight out of the hole in the dome cover.

Switches

In many installations it is necessary that certain lights only be operated by authorised persons, and for this purpose key type switches are available. The normal key switches, however, can be operated by means of other implements than the normal key provided. Two manufacturers were exhibiting key switches which are "tamper-proof" and appear to be the answer to attacks by nail-files and the like.

One manufacturer had two types on show, one in which the key can be removed after switching on and the other in which the key cannot be removed unless the switch is in the "off" position. These switches can be obtained in quantities with the same lock, but a master key can be supplied only for the type where the key remains in place when the switch is in the "on" position. The lock section of these switches are somewhat similar in appearance to the patent lock used on doors and the key similar to the ordinary door key. I did feel, however, that the appearance of the switch leaves much to be desired, as the cylinder lock projects from the face of the plate.

The other manufacturer displayed a similar type of switch, and I prefer this make as the projection of the lock is much less and therefore neater. I think that these switches have great possibilities as they do appear to be "tamper proof." This type of switch should prove invaluable to engineers in charge of institutions where unauthorised interference is a continual worry.

Earthing

I wonder why it is that this vital matter of earthing is so very often left to the last or pushed out of sight. It has happened again at Earls Court. Here was a stand whose sole purpose was to deal with earthing in all its aspects, and I found it placed in a remote corner of this vast exhibition. I hope that everyone who is interested in this problem visited the stand. The equipment is not new on the market but, in common with other apparatus, has been improved since its first appearance.

The system consists of an earth conductor with markings thereon to indicate the cross sectional area, the size (in current-carrying capacity of the largest cable the conductor is designed to protect) and an arrowhead pointing in the direction of the ultimate earth point. The conductor can be easily fixed on walls, etc., and a special tab has been made on the conductor in order that fixing holes can be made without interference to the cross sectional area of the conductor itself. Bonding clamps to suit are available for tee-off connections, terminations and intermittent bonding. There is also a bonding clamp suitable for final earth connections and it is one of the most robust I have seen.

I feel that greater use of this equipment could be made in factories, laboratories and hospitals, especially where the earthing of floors is required.

General Items

Among other items of interest, which I regrettably cannot comment upon in the space that is available, I saw a demonstration of the new core balance earth leakage circuit-breaker, and the combined core balance and voltage operated earth leakage circuit-breaker. Another demonstration that shows how lighting fittings are made was also very interesting, and a cable braiding machine attracted the inevitable crowd. I certainly found much to see and criticise throughout the Exhibition.

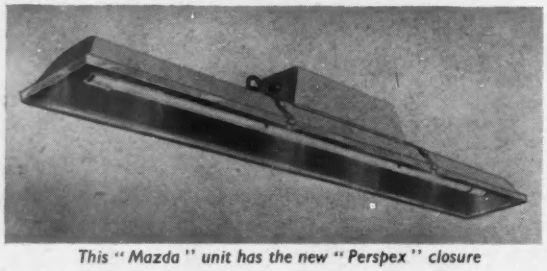
I hope the friendly criticisms on their goods were noted by the manufacturers and that some time soon we may see the results.

Equipment for Efficient Factories

Second National Factory Equipment Exhibition at Westminster

TO assist the growing ability of this country to produce more, to produce quicker, to produce with less waste, whether it be of manpower, machine power or materials is the purpose behind the gathering of manufacturers at the Royal Horticultural Society's Halls in Westminster this week (Monday to Friday) for the Second National Factory Equipment exhibition. This was one of the points from the speech at the opening on Monday by Lord Rochdale, President of the National Union of Manufacturers. He remarked that one had only to look round the exhibits on show and see the opportunities afforded to improve conditions in our factories. There are 150 stands to interest the visitor.

This year the Electrical Development Association are concentrating on the theme "Electricity for industrial heating and lighting." A Metropolitan-Vickers infra red heating unit is working in conjunction with a mechanical belt conveyor. Bottles of spirits with loose "Viskrings" are fed through the heater where they are sealed thus



This "Mazda" unit has the new "Perspex" closure

turning bottling hours into seconds. Resistance heating is represented by a Wild Barfield muffle furnace used for the heat treatment of enamelled badges, whilst a unit typical of high frequency induction heating is the model by the General Electric Co. This is suitable for a wide range of applications including the hardening of small parts.

Lighting

Industrial lighting fittings shown on the E.D.A. stand are suitable for the use of blended lighting and colour matching lamps. These are supported by photographic enlargements of typical factory installations. Lamps and lighting are also prominent on the British Thomson-Houston Co. stand where a range of fluorescent and tungsten lamps is shown together with the new colour corrected m.v. lamps and fittings. Other B.T.H. exhibits include examples of fractional and integral h.p. motors with associated control gear, geared motor units and the "Clearcall" factory broadcasting system.

Crompton Parkinson Ltd. are focusing attention on a range of squirrel cage induction motors complying with B.S.2083, standardising outputs, shaft sizes and fixing dimensions. This range is from ½ h.p. at 750 r.p.m. up to 25 h.p. at 3,000 r.p.m. Another C.P. exhibit is a range of switchboard indicating instruments including the new pattern 7 in. and 10 in. circular scale instruments.

Communications

Standard Telephones and Cables have divided their exhibit into a feature of telephone equipment showing private telephone systems, fire alarm systems and a range of telephone equipment and Stanelco equipments for soldering, brazing, annealing and hardening. The latest electro-gas equipments are featured together with new air operated versions of their resistance heating units.

Sterdy Telephones are also showing internal phone systems, intercom systems and staff locators, luminous signals, fire alarm and civil defence systems, with high their electric door lock which in addition to its normal use has been used in the interlocking of machine safety guards.

Service Electric Co. have a selection of works time signals, fire alarm and civil defence systems, with high velocity portable blowers, centrifugal fans for cooling, forced draughts and swarf disposal along with industrial hot air drying equipment and factory cleaning units.

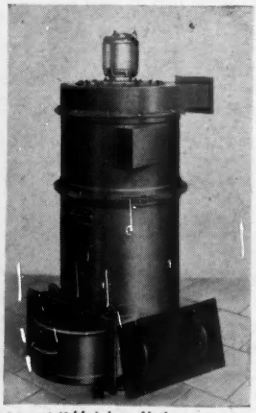
The Columbus Dixon organisation make a feature of their Dixon floor polisher, which has a wire brush detachment for "dry cleaning" works' floors. They also showed their Dixon "Squeegee" unit and for smaller areas the "Columbus" polisher-scrubber.

Tubewrights Ltd., a subsidiary of Stewarts and Lloyds Ltd., showed examples of their products. As their name indicates the firm specialise in the design and manufacture of fabricated tubular steel work. They have a welded tubular steel post pallet and also the "Pallage" system which permits the rapid building up of various forms of mechanical handling equipment from standard components.

An interesting American static eliminator unit, the Simco "Midget," is shown by the Croxted Manufacturing Co. This unit comprises a power unit (transformer, etc.) and one or more static bars ranging from 5/16 in. to 1¼ in. in diameter and from 1 in. to 12 ft in length. Applications range from printing presses and trimmers, plastic film machines to the textile industry.

The telephone unit shown on the Televox Co.'s stand is a useful amplifier unit which gives loudspeaking reception and speech and enables the user to have both hands free while in conversation.

For works transit efficiency electric trucks are well established. An example is the Pony truck which is available in 20 cwt, 2 ton, 6-8 ton types and a one ton version with a manual lift elevating platform. Brush Coachwork are also showing their "Cob" three wheel tractor for pulling loads up to 4 tons.



Exhibits include New Welbeck's "Bak-Vak" cleaner and right a Sturtevant "Uniclone" dust arrester.

POWER SUPPLY Statistics

FEBRUARY

IT is surprising to have to record for the second month in succession that last month the B.E.A. commissioned only one item of plant. This, as in January, was a boiler, which at Uskmouth A (South Wales Division) is the sixth so far recorded for this station. Of Babcock and Wilcox manufacture, this unit has a 360 klb/hr capacity with t.s.v. conditions of 900 lb/sq in. at 900° F. On the generating side, two 60 MW G.E.C. turbo alternators have so far been commissioned at this station, the complete programme providing for a total of six sets and twelve boilers.

Looking at the overall picture, the B.E.A.'s installed capacity therefore remains unchanged at 18,602 MW. Over the last twelve months up to 28th February, 1954, the total increase in installed capacity has been 1,372 MW, 7·72% above last year's corresponding total of 17,797. The North of Scotland Hydro-Electric Board similarly records no increase in installed capacity during February, the figure being 567 MW. This is a gain of 7 MW or 1·25% over the total at the end of February 1953.

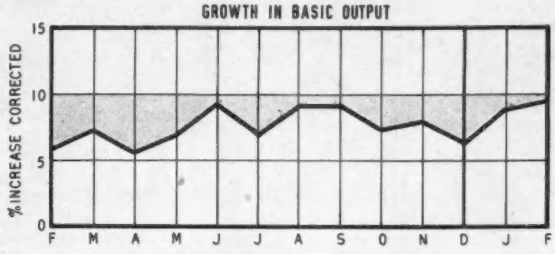
Energy Generated and Sold

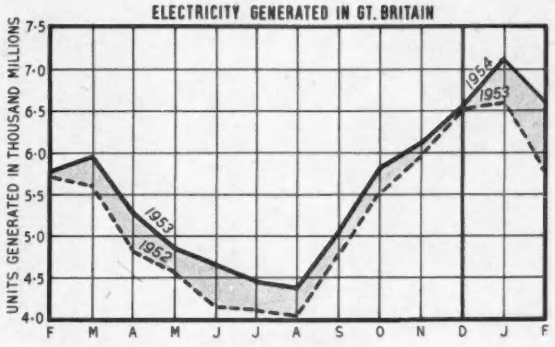
Both electricity generated and sales of energy are well up on last year's February figure, for which the severe weather at the beginning of the month is almost entirely responsible, the number of effective working days having been the same in both months. In fact, the average temperature for February this year was 36·7° F., 3.7° F. below the average for the same month last year. Moreover, the first week of February was the coldest of the winter, the average temperature over the country then being 27·7°F. During that week, incidentally, 1,690 million units were sent out for public supply from solid fuel fired stations, which is probably a record. Nationally, energy sales for February exceeded those for the month last year by 13·6%, the highest figure for the last two years at least. Even making allowance for the lower temperature, the increase of 9·4% is still high, and as it represents the basic growth of load being experienced by the Authority, shows that efforts being made to develop the load continue to meet success.

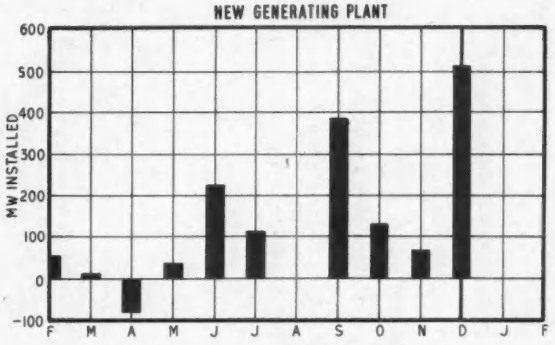
In Scotland, as might be expected, the effects of last month's cold spell are even more noticeable. Sales to areas by the N. of S. Board were 25·3% above February 1953. Although a considerable part of this increase is no doubt due to the lower temperature, it does indicate the continued progress being made by this board in increasing energy sales to its areas.

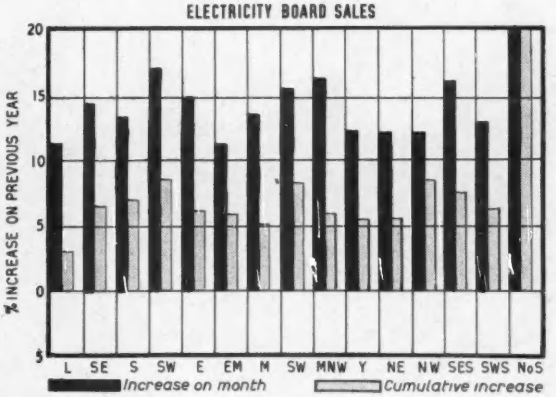
B.E.A. Sales to Area Boards in February

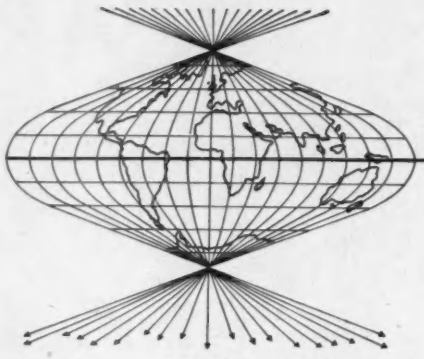
Board	Feb. Sales in million units	% inc. or dec. on Feb. 1953
London	609·5	+ 11·3
South Eastern	357·7	+ 14·6
Southern	409·1	+ 13·3
South Western	199·8	+ 17·2
Eastern	570·1	+ 14·9
East Midlands	458·1	+ 11·2
Midlands	629·4	+ 13·6
South Wales	321·9	+ 15·7
Merseyside and N. Wales ...	343·3	+ 16·6
North Eastern	341·6	+ 12·2
North Western	657·9	+ 12·2
South East Scotland	130·6	+ 16·2
South-West Scotland	314·3	+ 13·0
Direct Sales by B.E.A.	86·4	+ 26·9
Grand Total	6,016·0	+ 13·6











OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Sir Adam Beck No. 2 Nearly Ready

The first 100,000 h.p. generator at the Sir Adam Beck No. 2 generating station of the Hydro-Electric Power Commission of Ontario, is expected to be placed in service next month, we learn. This will be several months ahead of schedule. An official opening of the station is being planned for late August. The inauguration of the plant was brought a step nearer a few days ago when two rock plugs in the canal and forebay above the powerhouse site were blasted out. Mr R. H. Saunders, chairman of the Commission, has revealed that the first of the two 5½-mile tunnels 330 ft deep under the city of Niagara Falls will be carrying water in June. Ultimate capacity of the project is now fixed at 1,428,000 h.p. plus four more 100,000 h.p. units which can be added as required under the pumped-storage reservoir scheme adopted last year. It is anticipated that the first four 100,000 h.p. generators will be in operation this year, six more will follow in 1955 and the remainder in 1956.

B.C. Commission Held Negligent

It has been ruled that the British Columbia Power Commission were negligent in regard to the Whatshan power plant which was wrecked by a landslide last August. In view of this ruling, the three members of the Commission, Maj.-Gen. W. W. Foster, Mr S. R. Weston and Mr F. L. Shaw, along with Mr A. W. Lash, the chief engineer, have resigned in a body. In his ruling, given after a long investigation, Mr Justice Clive held that the Commission was aware of such a danger two years before the disaster, which caused about $1 million worth of damage. The Provincial Government has accepted the resignations of the officials, noted above, and in consequence it has delayed its decision on the damming of Buttle Lake on Vancouver Island to provide additional water storage for the John Hart power plant, to which we referred last week. The Commission's Whatshan power plant, which was almost buried under a million tons of mud, rock and debris which rolled down the mountainside, has two generators installed with a total capacity of 22,500 kW. The station was only put into operation in May, 1951. One of the sets has been back in service for some months now.

Gas for Power Stations?

The Hydro-Electric Power Commission of Ontario is contemplating using natural gas instead of coal at its Toronto and Windsor steam generating plants, when the gas from Alberta is piped into the Province, we learn. Mr R. H. Saunders, chairman of the Commission, has estimated that those two plants would use between 15,000 million and 20,000 million cu ft of gas annually. Earlier, one of Mr Saunders' fellow Commissioners, Mr W. Ross Strike, said that on the basis of present costs, the Commission would have to obtain the gas at 32 cents per 1,000 cu ft, which was considerably lower than any price so far mentioned for the Alberta gas, to compete with coal. The cost of converting the Richard L. Hearn steam station at Toronto to use gas was estimated at about $500,000. For some months now, since the plan to pipe natural gas from the vast Alberta resources has been in being, there have been suggestions that the Hydro-Electric Power Commission of Ontario might also take over distribution of the natural gas. But the Commission has turned down that suggestion. It has been said that the Commission's capital expenditure was large enough without tackling an additional $400 million or more in a natural gas development.

U.S.A.

Using the Missouri

The first of eight 40 MW generators at the Fort Randall dam, Nebraska, was officially put into service last week by remote control by President Eisenhower from the White House. The station will serve co-operatives of the Rural Electrification Administration in South Dakota and Nebraska. The seven remaining generators are scheduled to be put into operation at four-monthly intervals. Power from the station is being sold by the Bureau of Reclamation at a price of about 5 mills per unit, and will be resold by the co-operatives at seven or eight mills, we understand. In South Dakota the present average bulk price of power from private utilities is around fourteen mills per unit. The project, one of several planned to control and utilise the Missouri, was started in 1944.

EUROPE

French Atomic Power

An atomic pile at Saclay, near Paris, was the scene of an official visit recently. There, the plant has been providing a constant output of 800 kW for six months, although this is only the second pile to be operated in France, it is stated. Within a short time it is planned to increase the output of the plant to approximately 2,000 kW. In one of the Saclay laboratories, scientists are preparing with models and experiments for the construction of a 100,000 kW pile, which it is planned to build soon at Marcoule, in the department of the Gard. Graphite blocks will be used as the moderator in the Marcoule reactor. The moderator in the other two reactors is in each case heavy water. The impression of the visitors, apparently, was that although atomic research is well advanced in France, she lags behind other major countries in the practical field.

Germany's Trade

An indication of electrical production in Western Germany may be gained from the reports and balance sheets, just issued by two of the largest manufacturers —the Siemens group (of Munich and Berlin) and A.E.G. (of Frankfurt and Berlin). The Siemens and Halske A.G. and Siemens Schukert A.G. increased their sales by 125 million marks to 1,320 million marks in the year ended 30 Sept. last. Export sales accounted for 20% of the total. The A.E.G.'s total sales rose from 534 million marks in 1951-52 to 617 million marks in 1952-53. Of that figure exports were responsible for over 100 million marks. An official of that company has said that overall sales were now at an annual rate of about 700 million marks. Regarding the Siemens group, a spokesman estimated the investments of those companies at about 500 million marks since 1948. Part of a 100 million mark loan floated in January would be used as investments and the remainder set aside for export financing, especially since foreign buyers were asking for longer payment periods.

AFRICA

Tariff Increases

The Electricity Supply Commission of Southern Rhodesia is proposing to increase its tariffs. The Commission has asked the Government to approve proposals providing for a tariff increase of between 25% to 30%. Local mining concerns, in particular, are perturbed at the threat of a substantial rise in their charges. It may be recalled that in 1948 the Commission was considering raising its tariffs but the Government agreed instead to reduce redemption of capital payments for five years. That period has now expired and, seemingly, now that the redemption payments must be resumed, an increase in electricity tariffs has become inevitable particularly in view of the rapid rise in the cost of coal—about 70% since 1948.

S.W. ASIA

A Bulk Supply

An agreement has been signed for the continuation of the supply of electricity from Bharat to West Punjab. Under this the power taken is to be reduced from 5,000 kW, as at present, to 4,000 kW. This agreement comes into force from 1 Apr. when the existing one year pact ends. It has also tentatively been agreed that Punjab (Bharat) should supply West Punjab with 10,000 kW from 1955 for a period of three years with the stipulation that there would be no reduction in winter months.

Objection to Transfer

The Punjab Government has decided to entrust the management of the Lahore electric supply undertaking, Pakistan, to the Habib Bank, Executors and Trustees Co., Ltd. Following this recent announcement, about 1,000 employees of the Punjab Public Works Department threatened to strike if the city's power supply system was handed over to any private concern. But the Government has stated that it had already entered into an agreement with the Habib Bank about the management of the Lahore undertaking. Under this agreement the Habib Bank will control both generation and distribution initially for three years, and the agreement may be further extended. The reason for the change is that the Punjab Government has suffered heavy losses in the past years, despite efforts to improve conditions, it is stated. The P.W.D. employees' threat of strike action is to operate from the day the Government relinquishes control of the supply undertaking, we understand.

MALAYA

Malaya's Demand

To meet the increasing demand in Kuantan when the capital of Pahang, Malaya, is transferred there, two more 225 kW generators have been put into operation, to augment supplies from the power station which had three 300 kW sets already installed. It seems that the local demand is increasing fairly rapidly now. The power supply was extended to the outlying Kampongs within a two-mile radius of the town a few years ago, but further expansions are contemplated.

AUSTRALIA

Fresh Contracts Sought

The question of a contract for construction work at the Tennyson power house, Brisbane, was the subject of keen discussion at this month's meeting of the city council. Tenders had already been received for the work, but whereas the Stores Board's specification stipulated that tenders should be on a firm price basis without a rise and fall clause, two of the firm tendering, including Hornibrook Ltd., who quoted the lowest price, were only prepared to accept the contract if such a clause was included. The chief engineer and manager of the Brisbane Electricity Department, Mr P. A. W. Anthony, dissented from a Stores Board recommendation to call fresh tenders, and suggested that Hornibrook's be given the contract. He reported that it was particularly urgent that the contract be let at the earliest possible date. Installation of plant would be delayed unless parts of the building could be advanced to a considerable stage with the greatest possible speed, to give protection from the weather. The time of completion of the building was important, but it was still more important that specified sections be completed at a much earlier date to allow installation of turbine and boiler plant. Any delay in commissioning of the station would cost the council at least £10,000 a month, as a result of not being able to utilise the plant's increased efficiency over that of the New Farm station. The city council, however, adopted the Stores Board recommendation to call for fresh tenders on a rise and fall basis.

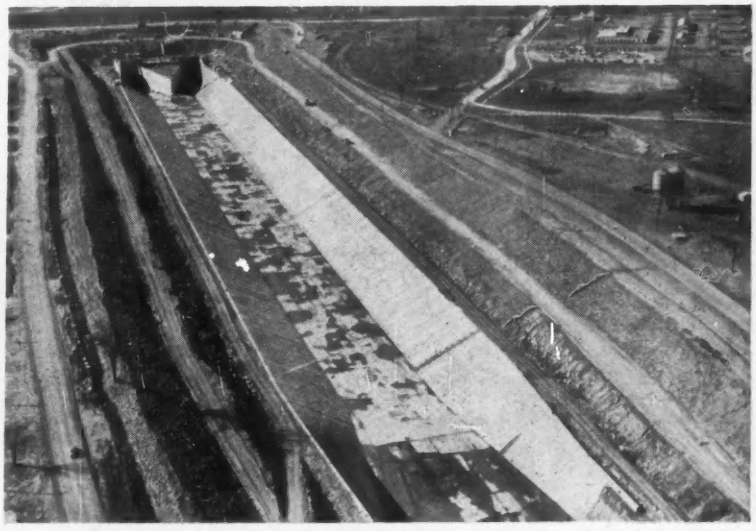
NEW ZEALAND

Alternative Supply Wanted

The necessity for the early commencement of construction work on the proposed Braeburn hydro-electric scheme, has been urged by a deputation from a number of electric power boards in the South Island, New Zealand. The deputation, consisting of representatives of the Nelson, Marlborough, Grey and West Coast power boards, have placed their views before the Minister of Works. They considered that it was advisable that there should be two sources of power supply to that part of the island—an alternative from the Canterbury line was needed.

Line Construction

By the middle of next year a new double circuit 110 kV transmission line will be established between the Roxburgh Gorge hydro-electric scheme and Dunedin, New Zealand. By the end of 1955 also, a single circuit 220 kV line will have been erected between the Roxburgh station and Christchurch to supplement that city's power supply. On these two power line projects, work is now progressing on the erection of the pylons.



The completed 2,200 ft. long trapezoidal section of the 2¼ mile open cut canal which leads to the headworks of the Sir Adam Beck-Niagara No. 2 generating station. This new station of The Hydro Electric Power Commission of Ontario, Canada, as we reveal on page 442, is now expected to be in operation next month. This open cut canal will carry water from the twin 5½ mile long tunnels to the forebay, at the rate of about 15 million gallons per minute

Personalities IN THE INDUSTRY

A director of the Ellison group of companies (George Ellison Ltd., Tufnol Ltd., and Alfred Ellison Ltd.), **Mr Arthur E. Skan,** has been elected chairman of the British Plastics Federation. Mr Skan has represented Tufnol Ltd. on the Federation since 1934, having been vice-chairman from 1952, a member of the Council since 1939 and chairman of the Laminated and Fibrous Products Group on three occasions. He is also a member of the Council of B.E.A.M.A., and of the Midland Electricity Consultative Council.

Mr M. Campbell Jones, chairman of Peto Scott Electrical Instruments, Ltd. has resigned from the Board in order to concentrate on other activities, and two other directors, **Mr A. G. Benstead** and **Mr R. N. Martineau,** have also resigned. The company states that **Mr C. F. Hollamby** and **Mr A. Meredith-Owens** have been appointed directors and Mr Hollamby has been elected chairman. **Mr J. F. Veevers,** who joined the Board twelve months ago, will continue as managing director. Both Mr Hollamby and Mr Meredith-Owens have had considerable experience on the sales side of the electrical trade. No major change in the policy of the company is intended as a result of these changes, we gather.

Mr S. Roberts, F.I.S.M.A., deputy general sales manager, Hoover Ltd., and a director of Hoover (Washing Machines) Ltd., has completed 25 years' service with his company, and been made a member of the company's "Quarter Century Club." Presentations were recently made to him in London on behalf of the company and his colleagues, in token of this. Trained as an engineer, Mr Roberts joined Hoover Ltd. in 1929 as a salesman. He was quickly promoted to posts of increasing responsibility and in 1937 was made a branch manager. After war service, he returned to the company to organise and extend the system of training on the sales side, and in 1946 was made sales personnel manager. The following year he was appointed field sales manager. He was made a director of Hoover (Washing Machines) Ltd., in 1950 and was appointed to his present post as deputy general sales manager last year.

Formerly education officer on the staff of the Institution of Electrical Engineers, **Mr W. H. Taylor,** B.SC., A.M.I.E.E., has now taken up his new duties as controller of education and personnel services to the General Electric Co., Ltd. Mr Taylor studied mechanical and electrical engineering at King's College, London, where he graduated in 1937. He obtained his industrial training as a graduate apprentice with the British Thomson-Houston Co., Ltd., Rugby, and remained with that company until shortly before joining the Armed Forces in 1941. He served in the U.K., West Africa and the Middle East, first with the Engineering Branch of the R.A.O.C. and later, on its formation, with R.E.M.E. By November, 1946, when he was demobilised, he had attained the rank of Lieut-Colonel. He joined the staff of the I.E.E. in April, 1947.

Mr G. D. La Niece has been appointed a joint managing director of Dictograph Telephones Ltd. with **Mr J. H. Whitfield.** Mr La Niece has been a member of the board for over 15 years and has been associated with the present company and its predecessor for 35 years.

Among those upon whom the City and Guilds of London Institute has conferred the Insignia Award in Technology is **Mr E. H. Jolley,** M.I.E.E., staff engineer with the Post Office Engineering Department, who is well known in international circles as chairman of one of the Commissions of the International Telegraph Consultative Committee. Mr Jolley began his Post Office career as a youth-in-training during which period he gained a number of City and Guilds Certificates.

Colonel J. D. Haigh, M.I.E.E., has been appointed Director of Electronics Research and Development (Defence), the Ministry of Supply has announced. He will be promoted acting Brigadier on taking up his new post. Colonel Haigh served in this directorate (then known as the Directorate of Telecommunications Research and Development) from 1946 to 1950, when he returned to War Office duties. **Mr H. W. Forshaw,** O.B.E., M.SC.TECH., M.I.E.E., assistant director in the Directorate of Electronics Research and Development, has been appointed to succeed **Dr G. W. Sutton,** PH.D., B.SC., M.I.E.E., as chief superintendent, Signals Research and Development Establishment, Christchurch, Hants. Dr Sutton is leaving the public service at the end of this month.

Appointed to be the new director of the British Refrigeration Association is **Mr Thomas Whittaker,** who has hitherto been assistant director of the Electric Lamp Manufacturers' Association. During the war he was commissioned in the Royal Artillery; he is also a barrister-at-law, having been called to the Bar of the Inner Temple in 1951. Mr Whittaker's appointment results from the impending retirement from the position of director and secretary at the end of this month of **Mr E. B. Batt,** to which we referred on 25 Feb. At the annual luncheon of the Association last Friday, the chairman, **Mr R. H. Hemmings,** presented three pieces of antique silver together with a television set to Mr Batt, from the Association.

At the Third Congress of the International Commission on Glass held in Venice last summer, **Dr B. P. Dudding,** vice-chairman of the Advisory Scientific

Mr A. E. Skan

Mr S. Roberts

Mr W. H. Taylor

Mr E. H. Jolley

Mr T. Whittaker

Panel of the G.E.C. Research Laboratories, was informed that he was to be awarded an Honour by the Italian Government in recognition of his services to the Italian glass industry. This has now been confirmed and Dr Dudding will become an Ufficiale of the "Ordine al Merito della Republica Italiana."

Hydro-electric engineer with the Merseyside and North Wales Division, B.E.A., **Mr J. Warnock,** M.C., A.M.INST.C.E., M.INST.STRUCT.E., is now visiting Canada under an agreement made between the B.E.A. and the Hydro-Electric Power Commission of Ontario. Principal object of the visit is to study the hydro power resources and equipment, and the operation of the Commission's plant. Mr Warnock is expected to return in about six weeks' time.

Lately district manager at Nottingham for the Edison Swan Electric Co., Ltd., **Mr S. R. Bond** has joined Harris and Sheldon (Electrical) Ltd. as sales development engineer for the East Midlands.

The South Wales Electricity Board announce that **Mr E. Conlon,** A.M.A.M.E. & MECH.E., senior assistant in the Purchasing Department at Head Office, has been appointed first assistant to the district commercial manager, District 347 (Cardiff East) in succession to **Mr H. B. Holloway,** B.SC., A.M.I.E.E., who was recently appointed district commercial manager, District 346 (Rhondda, Ely Valley).

Chosen as president of the Electrical Power Engineers' Association for 1954-5 is **Mr Ernest Hanson,** second assistant engineer (construction and maintenance) with the Yorkshire Electricity Board. Before joining the Yorkshire Electric Power Co. in 1935 he gained varied experience with several contracting firms, and with the Anglo-Persian Oil Co. in the Middle East. He is a member of the National Joint Board and the National Joint Advisory Council for the Electricity Supply Industry.

Formerly of Sheepbridge Engineering Ltd., **Mr L. Gamsa,** B.SC., has been appointed sales manager of the foundry of Slough Metals Ltd.

Ruston and Hornsby Ltd. announce that **Mr V. R. Prehn** has been made assistant managing director, and that **Mr G. B. R. Feilden** has been appointed to the board.

Mr A. G. Peacock, B.SC., A.R.I.C., A.INST.P., has resigned his position as secretary of the Scientific Instrument Manufacturers' Association, and has joined the board of Mervyn Instruments.

Mr C. C. Thrall, secretary of the Leicester sub-area of the East Midlands Electricity Board, is to retire at the end of this month after 44 years' service with the Leicester electricity undertaking. He is to be succeeded by **Mr J. A. Steeples,** the present assistant secretary, who has 42 years' service with the undertaking.

We are now able to reproduce a photograph of **Mr S. J. Beaney,** who, as we briefly noted last week, is to succeed Mr Gyngell as secretary of W. T. Henley's Telegraph Works Co., Ltd.

We hear that **Mr John H. Appleby,** A.M.I.E.E., M.I.MECH.E., has accepted an important position with La Electricidad de Caracas, and leaves for Venezuala about the middle of next month. It will be recalled that Mr Appleby was for some time chief electrical engineer, Public Works Department, Punjab Government, Pakistan.

Mr S. J. Beaney

Mr W. J. Brown

Mr J. Blears

After nearly fifty years' service, **Mr W. S. Tyrrell,** district engineer at Staines, to the Southern Electricity Board, has retired. At a dinner, recently, he was presented with a "Teasmade" appliance by Mr F. C. Oldcorn, sub-area manager, on behalf of colleagues.

At present shift charge engineer at Uskmouth power station, **Mr R. Mills,** A.M.I.E.E., has been appointed deputy station superintendent at Keadby power station, Yorkshire Division, B.E.A. Prior to going to Uskmouth, Mr Mills was shift charge engineer at Stuart St generating station, having earlier served there as assistant shift charge engineer, and as efficiency engineer at Meaford power station. He takes up his new duties on 12 Apr.

The vacuum products activities of the Metropolitan-Vickers Electrical Co., Ltd., has been merged with the New Products Department which has now been renamed the Scientific Apparatus Department. The officers of that department are: **Mr J. W. Buckley,** M.C., M.SC., A.M.I.E.E., F.INST.P., as sales manager; **Mr W. J. Brown,** B.SC., A.M.I.E.E., as assistant sales manager; **Mr J. Blears,** B.SC.(ENG.), A.M.I.E.E., ASSOC.M.C.T., as chief engineer; and **Mr R. S. Clark,** A.M.I.MECH.E., A.M.I.PROD.E., as assistant superintendent. Mr W. J. Brown, who joined the company in 1946 after earlier experience with Standard Telephones and Cables Ltd., and the Post Office Research Station, has been assistant to sales manager, New Products Department, since 1951. Mr Blears, who worked on proximity fuse design during the war, started investigations in high vacuum phenomena in 1943, and in 1948 took charge of the vacuum physics section. Mr Clark has been manufacturing engineer in charge of vacuum products (rectifier and X-ray) section, and on the transfer of that section to the Barton Dock works late in 1951, became assistant superintendent.

The Council of the University of Bristol has approved the appointment of **Professor M. H. L. Pryce,** M.A., F.R.S., to the Henry Overton Wills Chair of Physics in the vacancy created by **Professor N. F. Mott's** election to the Cavendish Chair of Experimental Physics in the University of Cambridge. Professor Pryce has been the Wykeham Professor of Physics in the University of Oxford since 1946. He graduated from Trinity College, Cambridge, and held academic appointments in Cambridge and Liverpool Universities before the war. During the war he was engaged in research on Radar and Atomic Energy. He was appointed Visiting Professor to Princeton University for the session 1950-51. Professor Pryce will take up his new appointment on 1 Aug., 1954.

Mr W. F. Randall, a director the Telegraph Construction and Maintenance Co., Ltd., has been elected chairman of the Radio and Electronic Components Manufacturers' Federation. **Mr C. M. Benham,** of Painton and Co., Ltd., is the new vice-chairman.

Mr R. E. Cranston, joint managing director of Line Equipment Ltd., has left this country for a short business visit to South Africa.

OBITUARY

Mr Guy Burney, the founder and first chairman of the Telephone Manufacturers' Association and managing director of Sterling Telephone and Electrical Co., died on 17 Mar., aged 83.

Mr C. H. H. Downing, A.I.E.E., M.I.P.E., principal of Downing and Partners, consulting engineers, died on 6 Mar., aged 53.

Mr J. H. Robinson, A.M.I.E.E., who founded, with his brother, the Croydon electrical contracting concern of J. & T. Robinson Ltd., died on 21 Mar., aged 75.

Mr F. W. Green, for many years chairman of E. Green and Sons Ltd., died on 20 Mar., aged 92.

Mr W. J. Williams, M.I.E.E., M.AMER.I.E.E., M.I.STRUCT.E., formerly electrical adviser to the Federated Malay States Government, died on 19 Mar. After retiring from that position in 1937, he was for some years general manager of the Trinidad Electricity Board.

PROBLEMS AND PRACTICE

In Engineering

Unearthed Neutral Systems

THIS factory is engaged in seasonal work of a continuous nature. Its raw material comes from farmers in the factory district and the crop must be processed before it gets too stale and loses its value. As daily transport of the crop has to be organised ahead it is essential that the factory maintains capacity output.

The factory generates its own power by means of two pass-out turbo-alternators generating at 400 V 50 cycles three-phase. There are about 300 motors, practically all squirrel cage, which should run continuously during the season. The power system, now over 20 years in operation, is unusual in so far as the star point of the generators are earthed free, the reason being that if an earth fault develops in the system production is not held up indiscriminately. As there is no solid earth path back to the generators there is no heavy fault current to trip breakers or blow fuses. Instead earth meters situated on the main switchboard warns the attendant who notifies the shift electrician. These meters are simply three voltmeters, one terminal of each connected to a phase and the other three connected in star and earthed. While the system is free from earth faults the meters will read the same but if a fault develops anywhere throughout the system the affected phase will give a zero meter reading.

Locating the earth is a process of elimination. From experience the electrician knows the weakest link—trailing t.r.s. cables, hot steamy places—and these receive attention first. Test lamps are used in testing sub-circuits, being connected between each phase and earth. The lamps fail to light off the faulty phase. Fixing the lamps to maintain contact he switches off and on the most likely motors rapidly. The lamps will flash a warning when the offending circuit is reached. It is found that if a squirrel cage motor is switched off and on smartly, under load, no harm results as the machine has not time to lose speed. If this panel is found to be free, the same procedure is repeated at the next likely panel and so on until the offender is located. Then if this gear is vital to the process, arrangements are made to replace or repair it at the time when it will cause the least disturbance, generally a shift change.

Apart from being an aid against indiscriminate stoppages due to earth faults, the system also has the virtue of leaving the gear less prone to become alive and endangering life or limb. As there is no heavy rush of fault current metal parts cannot build up a high voltage to earth.

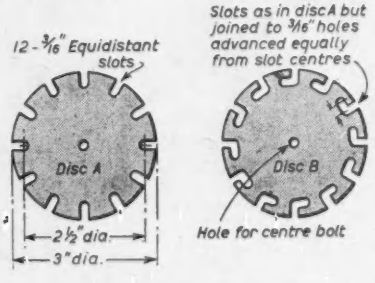
Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

As the electrical installation is ageing it is natural to expect that faults will become more frequent and this is causing a good deal of thought as to the pros and cons of the existing system versus the earthed neutral system. Those for the earthed neutral claim that there is less strain on insulation as the voltage to earth is tied at 230 V. The argument against being that earth faults are bound to occur on and off and that with the earthed neutral the faulty machine, will more than likely come to a standstill at the most awkward moment and cause severe dislocation. Also with the atmosphere in some parts being so hot and steamy and prone to corrosion that it will be difficult to maintain the bonding in such a condition that it will carry the heavy fault currents without danger. Perhaps some reader might care to shed some light on the subject by drawing on his own experience.—*B. C. (Eire).*

Aligning Cables

HAVING to wire a number of long conduit runs with a maximum number of small cables, I made up the equipment shown in the sketch. It has since proved of great value in keeping cables correctly laid at the necessary draw-in boxes.

Two "Perspex" discs were cut as shown, mounted on the centre bolt with slots aligned and held in position by tightening the wing nut on the centre bolt. At the draw-in box, where the cable bunch had been pulled out prior to feeding into continuing conduit run, the cable bunch was opened, as near as possible to its egress, and the discs were inserted in the centre of the bunch with the individual cables lying in their correct relative position in the slots as they entered the draw-in box.


12-3/16" Equidistant slots
Slots as in disc A but joined to 3/16" holes advanced equally from slot centres
Disc A
Disc B
2½" dia.
3" dia.
Hole for centre bolt

With this device of two slotted "Perspex" discs, cable bunches may be kept neat and tidy

Slackening the wing nut, rotating disc "B" to prevent the cables slipping out of the slots, re-tightening the wing nut, before the discs were slipped along the cables to the point of connection with the draw-wire, this ensured correct position before further entering of the conduit run, the discs being slipped back as drawing-in proceeded. When finally pulling-up the cables, it was an easy matter to slacken the wing-nut, re-align the slots and release the cables, leaving them with no unsightly cross-overs and dangerous kinks when in the drawn-up position.—*G. W. Clegg.*

Falling Power Factor

DURING a recent four-hour load test of a standby diesel alternator set, when all meter readings were recorded at 15 minute intervals, the following was observed.

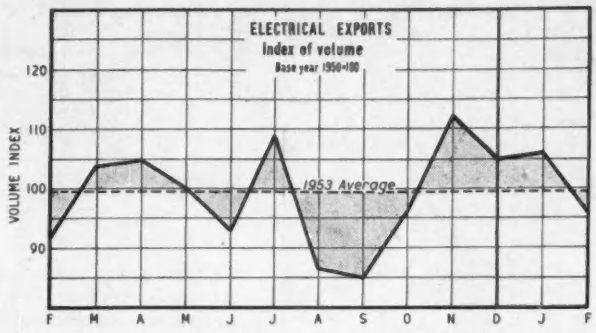
After the test the meter readings were considered in detail and it was noticed that the power factor throughout 75% of the test had gradually fallen from the reasonable figure of 0·92 lagging to the low value of 0·77. This was no sudden change of load, the falling increments being of the average order of 0·01 for the first three hours. For the last 60 minutes (four readings) the power factor was constant at 0·77 lagging.

These bad power factor readings were indeed puzzling as they had never been observed on normal mains supply.

Two large induction motors constituted an appreciable percentage of the load and these normally operated on automatic control and so arranged to cut out when their respective loads were sufficiently reduced. In order to provide as much load as possible for the purpose of the test, the motors had been switched to hand control. The effect of this was to override the automatic cut-out mechanism and keep on running with their respective loads becoming less and less, until they were operating on extremely light loads with, consequently, a low power factor.

In conclusion it is not uncommon to find a motor rated higher than necessary driving a particular load. While a small reserve of power may be quite desirable in certain circumstances, a large induction motor running well below its rated horse power at all times, is not good practice and its bad power factor often not considered.—*S. Arnold.*

EXPORTS and IMPORTS



Statistics for February

IT will be recalled that under the new classification of items in the monthly Trade and Navigation accounts, the volume of electrical exports for January could be indicated only approximately. It has now been possible to obtain an index showing the volume of electrical exports during the last year, based on the new classification. Electrical exports include not only goods, appliances and apparatus, but electrical machinery which had been shown previously as a separate item. The slight rise in the volume of exports during January, indicated by the rise in the volume index from 105 to 106 was not maintained in February. No doubt the incidence of severe weather during part of the month, coupled with the considerably fewer number of working days, contributed to a large extent to the decrease. The volume index which was at 106, fell ten points to 96, a little below the 1953 average, and the same value as October last year. Last year's corresponding February figure, however, was 92 so that the volume of exports for February this year is somewhat better. All index figures are based on 1950 as 100. In value, exports in this class amounted to £13,444,880, whilst for January they totalled £14,957,845. To these figures we have added export values in respect of electric washing machines and power-operated automatic refrigerators to give the totals below.

The largest importer of all types of electrical goods last month was Australia which took apparatus to a total of over £1,775,000. Second highest in the list was the Union of South Africa, with a total of £1,390,039, while India took £872,349 and Pakistan £448,860.

Description	Exports Value (£)			Imports Value (£)	
	Monthly Average 1952	February 1953	February 1954	February 1953	February 1954
Generating Sets:					
Diesel up to 200 kW	408,225	396,441	180,272		
,, over 200 kW...	214,949	132,936	191,839		
i.c. driven	31,920	23,293	23,776		
Steam turbine driven	143,882	26,988	2,756	37,666	28,764
with other prime movers	31,520	41,818	64,817		
Generators	210,823	106,277	274,023		
,, parts	369,110	108,456	543,287		
Motors	892,465	886,305	906,750	42,807	36,978
Motor starters and controllers	234,035	183,621	193,478		
Convertors and rectifiers	103,602	121,011	66,079	28,874	33,313
Transformers	873,260	907,837	840,254		
Switchgear and Switchboards...	1,291,656	1,197,698	1,423,491		
Batteries, primary and parts	212,536	202,448	307,254		
Fluorescent and Discharge lamps	53,194	33,476	66,536		
Other lamps	123,932	90,191	92,397		
Radio and Electronic gear	1,916,241	1,727,364	1,706,404	213,964	637,318
Telephone and Telegraph Plant	1,372,016	1,271,838	1,408,852		
Cooking Appliances and parts	114,943	112,946	116,102		
Space heaters	26,489	27,948	37,355		
Water heaters	32,963	22,182	19,682		
Other heaters and parts	128,498	96,947	137,727		
Welding machinery	86,132	90,483	80,101	102,822	5,626
Signalling and Bell equipment	53,722	56,602	66,869		
Commercial Instruments	135,473	122,191	132,853	33,691	44,034
House Service Meters	147,816	67,892	106,822		
Electro-medical and X-ray apparatus	118,910	108,841	91,221	19,538	35,585
Fans	110,447	109,328	94,813		
Vacuum Cleaners	159,303	166,545	200,124		
Other Appliances and parts	232,481	144,868	381,008		
Portable power tools	112,423	136,301	141,555		
Washing Machines up to 150 lb	443,379*	146,409	298,202		
Power Refrigerators, up to 12 cu ft	565,985	390,894	329,333		
Telephone and Telegraph Cables	746,946	750,139	354,194		
Paper-insulated Cables...	883,068	1,076,415	449,916		
Rubber-insulated Cables	622,124	461,488	315,943	9,705	12,284
Winding and similar wires	151,677	160,230	100,388		
Other Cables and Wires	276,939	337,291	197,860		
Accumulators and parts	452,491	242,932	292,290		
Insulating Materials	165,900	90,905	108,110		
Electrical Ware	103,886	113,012	100,519		
All other articles	1,595,762	1,350,963	1,608,073	171,771	309,000
Total	16,051,060	13,861,027	14,072,415	672,674	1,142,902

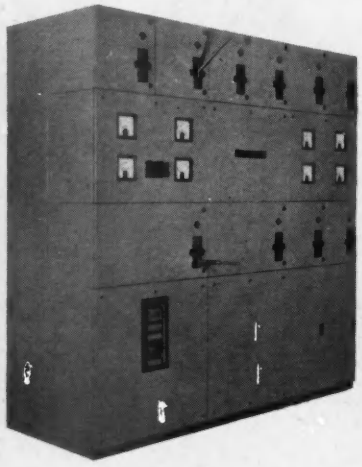
* Including models of up to 250 lb in weight

Equipment for Industry

"Superform" Wins Silver Plaque

MANY engineers who visited last week's Electrical Engineers Exhibition probably inspected the new design of "Superform" switch and distribution gear shown by the ENGLISH ELECTRIC Co., LTD., Crown House, Kingsway, W.C.2. They will be interested to know that the Silver Plaque was presented to this company for the "Superform" fused switchboard shown in the illustration, this award being made for originality, design and construction, standard of workmanship, labour-saving attributes and ease of operation and maintenance.

"Superform" fused switchboards are built up with chassis mounted, front-operated fused switches of q.m.q.b. action. To present a uniform flush appearance, the operating handle of each switch retracts into the switch housing when not in use, thus permitting the spring-loaded, engraved aperture cover to return to its normal position. This feature not only ensures a flush finish but prevents the ingress of dust and dirt into the housing. Moreover, the aperture cover may be locked shut with the switch in the off position to prevent the circuit being energised when work is being undertaken on the outgoing side.



This "Superform" fused switchboard has gained the exhibition Silver Plaque for English Electric Co.

Each switch door is hinged on the l.h. side with securing provided by two thumb screws. Interlocks prevent the door being opened when the switch is on, and the switch being made when the door is open. The latter safeguard may be circumvented for maintenance and similar purposes provided the main supply to the board is disconnected. Switch units, which are available in ratings of 60, 150, 300, 500 and 750 amps, are provided with mechanical on/off indicators viewed through a small glass window in the door.

For metering, flush-type instruments may be accommodated to suit individual requirements, meter panels being hinged to provide ready access to connections. One of the features is the insulation of all instrument terminals. Similarly each back connection from the fused switches is insulated, enabling connections to spare circuits to be made with safety whilst the board is on load. To protect small wiring, h.r.c. fusing is inserted at the point of connection of potential circuits to either busbars or outgoing f.s. terminals. Such fusing is in addition to potential fuses already provided on the instrument panel. As the latter are of lower rating they will discriminate against the larger fuse to isolate an instrument fault whereas the former protect small wiring. For distribution purposes, "Superform" dis-boards may be incorporated in the lower part of the switchboard.

Starting Aero Engines

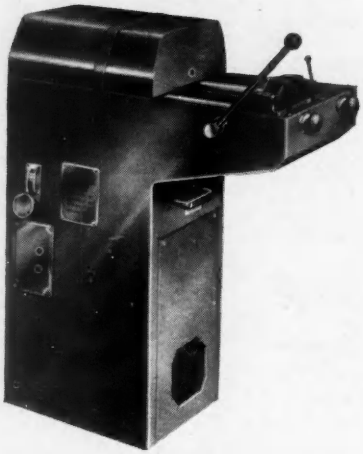
ALTHOUGH a recognised source of ground supplies for aircraft, the petrol or diesel engine driven generator set suffers from the disadvantage that during aircraft refuelling, the prime mover must be stationary. Should it prove necessary to provide a servicing supply during refuelling, the prime mover must be placed some distance upwind of the aircraft, which involves greater cable lengths. On the other hand, these difficulties can be overcome by the use of equipment, comprising transformer and metal rectifiers, which is fed from a standard a.c. mains supply.

The use of this type of equipment is being extended to meet requirements of the larger jet and prop-jet machines sited on the aircraft apron. In many cases, the installation of an a.c. ring main for this equipment is well justified, or an associated engine driven set may be used, which, generating at a standard voltage, may be situated someway from the aircraft being serviced, without introducing difficulties in supplying the rectifier unit.

For the dual purpose of aircraft servicing and engine starting, the "Westruk" type 960, developed by the WESTINGHOUSE BRAKE AND SIGNAL CO., LTD., 82 York Way, Kings Cross, N.1, in conjunction with the Ministry of Civil Aviation, is one such unit. Suitable for starting most of the larger type aircraft having an internal d.c. supply potential of 28 V (which includes the Comets I and II) the unit makes special provision for limiting the open circuit voltage to 28·5 V yet having a high enough voltage output to provide the peak power on starting, when the current may be some 2,000 amps. Transportable and completely weatherproof, the unit is arranged for manual operation. Its components include a double wound three-phase mains transformer which complies with B.S. 171, an arangement of three-phase rectifier elements and an instrument and control panel. Overload protection operates at 10% above the continuous full load rating of 500 amps, although this arrangement is over-ridden on starting.

"Staffa" Screwing Machine Cheaper

A RECENT announcement of CHAMBERLAIN INDUSTRIES LTD., Staffa Works, Staffa Rd, Leyton, E.10, states that the price of their ¾ in. single spindle screwing machine has been reduced from £295 to £245 net, ex works,



Chamberlain Industries' ¾in. screwing machine whose price has recently been reduced

excluding diehead-operating yoke, and chaser holders.

For high-speed threading of bolts, pipes and small components used in the engineering industry generally, the cutting assembly of the machine is mounted above and integrally with a pedestal, which houses the motor, cutting lubricant reservoir and bearing housing platforms. The hollow spindle on which a rotating die-head may be fitted, runs in self-lubricating "Oilite" bearings with thrust washers of the same material to accommodate end loads during the cutting operation. The carriage assembly itself comprises a flat-top table, to which any form of self-centering vice or work-holding fixture may be mounted. Although light in weight the carriage in stated to be constructed to resist arduous wear and tear. Two tubular guide bars run the length of the cradle to provide the slide bed. Extended either side of the front bearing housing, these bars maintain correct alignment of the table top with the centre of rotation of the spindle.

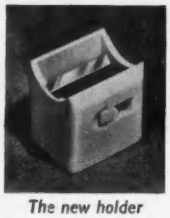
Low Price Hoover Washer

AS from 22 Mar. HOOVER LIMITED, Perivale, Greenford, Middlesex, are retailing a version of their washing machine but without the wringer at the low price of 20 guineas making with tax a total of £28. 17s. 6d.

This model is exactly the same as the Mark I model apart from the absence of the wringer. The other versions of the washing machine will continue to be retailed as before.

Locking Holder for Strip Lamps

FOR use with architectural lighting tube lamps the BRITISH THOMSON-HOUSTON CO., LTD., Crown Hse, Aldwych, W.C.2, have produced a new vibration-proof version of the special Mazda lampholder.



The new holder

A thumb nail catch on the side of the holder locks the lamp socket by turning a cam preventing the clip holding the lamp peg from opening. This ensures a good contact and the positive retention of the lamp. The socket is locked when the catch is closed. Moulded in ivory white, the lampholder has a single fixing hole and can be easily adapted for surface wiring if necessary. Price per pair is 6s. 8d.

Kerodex Barrier Cream

FROM 1 Apr., 1954, the industrial barrier creams marketed by INNOXA (ENGLAND) LTD., 1 Eden St, N.W.1, will be known as Kerodex Barrier Creams.

The reason for this change of name is that Kerodex has for some time been well known, and extensively sold, in most overseas countries, and it has now been decided that this name will be used to ensure that all the firm's industrial barrier creams are known universally under one title.

Aerialite TV Aerial Prices Drop

THE prices of the television aerials and accessories supplied by AERIALITE LTD., Castle Works, Stalybridge, Cheshire, have been reduced. New prices are as under.

Unex Model 83x	£2. 0s. 0d. (all channels)
Unex Model 83a	£3. 14s. 6d. (all channels)
The above are 2s. 6d. extra for Horizontal channels	
Unex 83c & 83c Hor.	£3. 14s. 6d. (all channels)
Models 65 & 65a	£1. 9s. 0d.
Models 66 & 66a	19s. 6d
Models 82 & 82a	£1. 1s. 0d. (all channels)
Part No. 143	1s. 8d.
Part No. 153	4s. 6d.
Part No. 149	1s. 0d.

Duplex Aerial Model 77 existing prices plus 2s. 6d. extra for horizontal channels.

"Linolite" Developments

WELL known in the trade as makers of "strip" lighting, LINOLITE LTD., 118 Baker St, London, W.1, have announced the introduction of a new lampholder. This is being introduced for all single lamp standard reflectors and type SK and embodies the following points. It has conical spiral springs which make positive contact and support the lamp centrally in position. They also effectively damp vibration and permit insertion of the lamp from either end. The shrouding gives added protection.

TRADE PUBLICATIONS

DISTRIBUTION.—Cable sealing boxes for transformers (Pub. E.N. 207) and braided aerial conductors (E.N. 206) are new publications by Enfield Cables Ltd., Brimsdown, Middx.

RADIO EQUIPMENT.—Publication 699 by the PLESSEY CO., LTD., Ilford, Essex, gives full details of the type PTR 61 V.H.F. equipment for light aircraft.

CHEMICALS AND PLASTICS.—New edition of "Monsanto Chemicals and Plastics" by MONSANTO CHEMICALS LTD., 25-27 Charles II St, London, S.W.1, replaces the firm's list published in 1952.

LAMPS AND LIGHTING.—SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD., 38-39 Upper Thames St, E.C.4, have issued a new set of lamp catalogues consisting of four separate 3-colour publications covering general service lamps and fluorescent tubes, projector lamps, automobile lamps and discharge lamps all contained in a matching stiff binder.

NICKEL ALLOYS.—Publication 685 issued by HENRY WIGGIN AND CO., LTD., Thames House, Millbank, S.W.1, deals with nickel alloy spring materials.

ELECTRIC MOTORS.—Brook Motors Ltd., Empress Works, Huddersfield, have published an unusual folder (List 782) on their electric motors and control gear.

ELECTRIC CLOCKS.—Latest attractive publication published by GENT AND CO., LTD., Faraday Works, Leicester, is entitled "How do you find the time" and is intended to emphasise the need for modern clocks, especially in business premises being renovated.

CABLES.—New lists issued by the BRITISH DISTRIBUTING CO., 591 Green Lanes, London, N.8, cover odd length coils of cables and flexibles.

FURNACES.—Publication RF5 issued by ROYCE ELECTRIC FURNACES LTD., Sir Richard's Bridge, Walton-on-Thames, Surrey, describes their special purpose high temperature furnaces.

NICKEL ALLOYS.—No. 25 issue of "Wiggin Nickel Alloys" isssued by HENRY WIGGIN AND CO., LTD., Thames House, Millbank, S.W.1, contains a description of the automatic temperature control device in the "Singer" iron.

HOTEL RADIO. — COMMUNICATIONS SYSTEMS LTD., 8 Arundel St, W.C.2, have issued a leaflet illustrating their hotel room radio coin box system.

COMPONENTS.—No. 43 issue of the Technical Bulletin issued by THE TELEGRAPH CONDENSER CO., LTD., (Radio Division), North Acton, W.3, deals with tubular ceramic pulse feed condensers.

For the Electrical Trade

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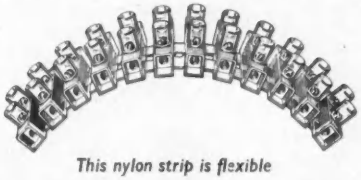
All standard Linolite reflectors are being made available in a chemically brightened and anodised finish, providing higher efficiency and durability. Type MH mirror clips are a new line which, boxed separately in pairs, make MH fittings into portable units for clipping on to mirrors, bedheads, etc.

12-way Nylon Terminal Strip

INTRODUCED from Denmark by ELKAY ELECTRICAL MANUFACTURING CO., LTD., 42 Woburn Place, W.C.1, is a 12-way terminal strip in flexible nylon, which can be bent to take the shape of any particular contour to which it might be fixed. The strip can be cut with a knife or scissors into smaller groups of terminals as required and there are fixing holes between each pair of terminals. It measures 4⅛ in. long x ⅞ in. wide x ⅝ in.



This nylon strip is flexible

high. The cable entry holes are ¼ in. dia. and will accommodate cables up to 7/·064 in. It is rated at 15 amps, 250 V to earth, or 400 V between terminals. The retail price is 44s. per dozen.

Paint Strainer does not affect Spray Pressure

A PAINT strainer has now been marketed by B. E. N. PATENTS LTD., High Wycombe, Bucks, for use with their paint spray equipment. This new "Freeflo" strainer is marketed at a net trade price of 5s. 6d. each. It is made from a fine mesh brass screen, is suitable for all types of syphon feed and internal mix pressure feed spray guns, with material tubes ⅜ in. outside diameter. Great advantage of this new accessory is that preliminary straining is not necessary, the paint being automatically strained during use. Thus it does prevent the clogging and spitting which prevents a perfect finish.

NEWS OF THE WEEK

28,000 see Third Electrical Exhibition

Organisers' Ambitious Plans for the Future

COMPLETE satisfaction and unprecedented success in business sums up the third, the largest, and the best attended Electrical Engineers' Exhibition held at Earls Court during the latter five days of last week. As far as we were able to ascertain, there was unanimous approval expressed by the 179 exhibitors, firstly of the organisation itself and secondly, of the amount of business done. Attendance during the five days was nearly 28,000 or an average of just under 5,600 a day compared with last year's total of 14,250 over four days. Among the visitors was a satisfactory proportion of overseas delegates. We are informed that 23 countries were represented, including the U.S., Russia, Ethiopia, Iraq, India, Pakistan, Ceylon, New Zealand, and in Europe, Norway, Sweden, Denmark, France and Italy. Many schools and Technical Colleges in all parts of Britain sent parties to look round the exhibition. The two trophies awarded to the exhibitors adjudged to have presented the most outstanding developments in industrial and domestic labour-saving equipment went to the English Electric Co., Ltd., and to Aidas Electric Ltd.

THREAT TO B.I.F.

THERE is to be little rest for the newly-formed organising company who start at once on the 1955 exhibition. If there was any doubt before about the continuation of this event, there is none whatever now. A large proportion of this year's exhibitors have already placed their orders for space at the 1955 display and many of those have asked for double the amount of stand space. Reason appears to be that exhibitors consider it far more worthwhile to put on a really good show at the Electrical Exhibition and ignore the electrical section of the B.I.F. Many firms, we understand, are to discontinue their displays at the B.I.F. and concentrate on this specialised exhibition. This, of course, will be a big loss to the B.I.F., but it is generally held that the Electrical Exhibition is far more profitable, particularly for the smaller firms. This factor was one of many expressions of anxiety raised in the House of Commons during the passage of the B.I.F. Bill.

DOMESTIC SECTION

TO meet this trend of opinion we understand that consideration is being given to a domestic section at next year's show. This will not mean the admission of the general public, but it would extend interest to the small dealer and contractor. If this suggestion is agreed to, the more domestic exhibits are likely to be situated round the perimeter of the exhibition.

Organising committee of the A.S.E.E. Electrical Exhibition. Left to right (standing) are H. E. Tickner, E. A. Bromfield and P. A. Thorogood, and (sitting) R. F. Twentyman, E. J. Sutton, J. Flood, ex officio, J. H. K. Pendry, L. L. Emmett and W. J. Wheeler

With this new field in mind, admitting a number of new exhibitors, as well as the request for double space, consideration will have to be given also to the siting of the exhibition. Will the organisers have to take over the galleries at Earls Court as well as the little remaining space in the main hall? Or will they have to seek alternative accommodation for this increasingly popular event?

Another possibility believed to be under consideration at the present time is a separate domestic exhibition to be held in September. Rumours as to a change of date have little foundation unless it should become possible to take over Earls Court at the time of the B.I.F. All these proposals will, of course, be considered in the light of the views of the exhibitors themselves. The A.S.E.E. is quite emphatic on the point that they will always accede to the wishes of those participating in the exhibition.

FUTURE THEMES

WHATEVER additions or alterations are made in the programme for 1955, the theme of next year's show will be "Motive Power." The Illumination Way of 1953 and Switchgear Avenues of last week are to be followed by Electric Motor Lane—or whatever other appropriate name is chosen. 1956 is still a long way off but there are rumours that the exhibition will make even last week's spectacular show look like a village bazaar. A Festival of Electricity is the idea which has been proposed and which has met with not unfavourable response. The idea, still in its infancy, is for one huge shopwindow of electrical goods.

E.T.U. WAGE CLAIM GOES TO ARBITRATION

2d. an Hour Increase Insufficient

ARBITRATION has been asked for by the Electrical Trades Union in its claim for a substantial increase in pay for electricians in the contracting industry. This claim is additional to the 2d. an hour granted by the National Federated Electrical Association, to which we referred last week. It is understood that the E.T.U. is seeking another 2d. an hour for electricians in London and 1½d. for those elsewhere. Mr W. C. Stevens, general secretary of the E.T.U., has stated that the Minister of Labour, Sir Walter Monckton, had been notified that a dispute existed, and was asked to arrange for an early hearing of the case by the Industrial Disputes Tribunal. Mr L. C. Penwill, director and secretary of the N.F.E.A., stated that they had consistently advocated arbitration but it had hitherto been rejected by the union. The association welcomed an impartial examination of the claim.

This decision follows a weekend meeting of the N.J.I.C. (reported last week) when the Union refused to allow the N.F.E.A. more time to consider the additional claim for a further increase.

Offices in London

THE Association's move to central London is not far distant now. We anticipate that an announcement that the A.S.E.E. is to take over offices in Bloomsbury Square will be made shortly. The premises are understood to be large enough to accommodate the Exhibition Company as well as the Association's other staff. Situated as they are now at Barnet, Herts, the A.S.E.E. have been operating under a handicap (especially as regards the organisation of large-scale exhibition) which a move into London should remove for the convenience of all concerned.

Royal Society of Arts celebrates Centenary

ON MONDAY of this week, the Royal Society of Arts celebrated its two-hundredth birthday. It was founded to stimulate art and industry by offering prizes, and for the first century of its existence this was indeed its main activity. More recently it has mainly worked through the giving of lectures, the publishing of papers, and the holding of examinations. Its attention has been increasingly given to the application of the arts.

In the early days of the Society, there were several of the early names in the development of electricity amongst those who received its premiums. Most notable, perhaps, is William Sturgeon who, in 1825, was awarded a silver medal and 30 guineas for an improved electromagnet. This was, of course, before Faraday's electromagnetic work. Other rewards covered batteries, so important in those days, and insulation, while the parellel work of the early steam engineers also attracted the attention of the Society.

In the later nineteenth century, when dynamos were being developed for electric lighting purposes, the Society gave them marked attention, and the various electric lamps that were invented were demonstrated to its members. Later it installed its own generating plant at its Adelphi headquarters, though this was later replaced by a public supply.

Now that the activities of the Society so far as electricity are concerned, are mainly confined to the organisation of lectures, the old interest in keeping abreast of the times remains, and there have been few generally interesting electrical developments in recent years that have not been covered in lectures delivered by the eminent engineers directly responsible for them.

Electric Railway under Tyne

A SCHEME for the construction of an electric railway under the river Tyne has been forwarded to South Shields Corporation with an inquiry as to whether they would be prepared to discuss the matter. The proposition, which is estimated to cost some £1 million, is intended to link Tynemouth and South Shields. Mr E. W. Chalmers Kearney, consulting engineer, is responsible for the idea. Original suggestion was made as long ago as 1921 and involved a high-power electric railway link between the boroughs. Since then there have been several demands to revise the scheme. Original cost was calculated at £330,000.

OFFICIAL PUBLICATIONS

CIVIL DEFENCE (ELECTRICITY UNDERTAKINGS) REGULATIONS, 1954. Draft S.I. H.M.S.O., 3d.

ELECTRICITY INDUSTRY. Position of electricity supply industry in O.E.E.C. countries, 1953. H.M.S.O. 4s.

D.S.I.R. Report of Department for year 1952-53. H.M.S.O. 8s. (See page 436.)

Yorkshire's Public Speakers Qualify

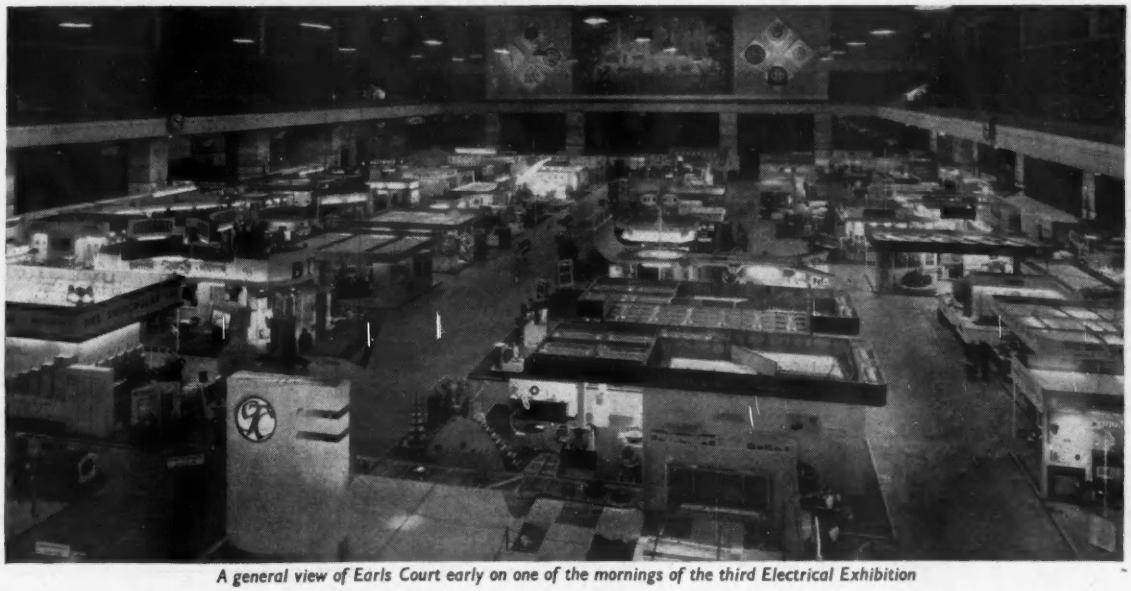
THERE were eleven entrants in both the men's and women's sections of the Yorkshire Area finals in preparation for E.D.A.'s Public Speaking Competition. The event took place at the beginning of this month. Winners were Miss Thelma Parkinson of Sheffield, who spoke on "The Housewife in the Reigns of the Two Elizabeths," and Mr L. W. Pearson of Bridlington, who spoke on "Bringing Electricity to Rural Areas." Runners-up were Miss June Tordoff of Bradford and Mr G. H. Whitehead of Scunthorpe. The winners will go forward to the National Finals scheduled to be held in London on 23 Apr.

MORE FACTS IN GAS v ELECTRICITY DISPUTE

LATEST news in the "gas or electricity for council tenants" controversy comes from Sittingbourne (Kent), Motherwell and Stewarton. At Sittingbourne, it has been decided to go ahead with supplying electricity to pre-war council houses. Some discussion arose because a few tenants had already installed a supply at their own expense, and if a charge was to be made they would in effect be paying twice. Cost of the scheme (estimated at £13,000) is to be met from the expected balance on loan charges. Tenants on Motherwell's new Forgewood estate comprising some 1,350 houses are to be offered a choice and the council calculates that this decision will save them £13,500 because they will only have to lead gas or electricity supplies into the house and not provide the cooker and washboiler. Incidentally, this decision is likely to have its effect on several other local authorities committed to build a total of over 18,000 houses this year. It is also probably the first major success in this direction of the S.W. Scotland Electricity Board who have cut their charge for installation from £15 to £4. 17s. 6d. The thorn among this week's roses is Stewarton where a motion to equip houses with electric cookers has been defeated. The same Electricity Board's offer was rejected in favour of the Gas Board's proposal of £4. 10s. per house, 1s. per week hire charge and the transference of ownership after 10 years.

Employment and Welfare

LATEST five-day residential course to be organised by the Institute of Personnel Management will be on "Employment and Welfare." It will take place at the Coburg Court Hotel, Bayswater Rd, London, W.2, and will open on 28 Mar.



A general view of Earls Court early on one of the mornings of the third Electrical Exhibition

Fluorescent lighting in the 64 ft high main erection bay of Ferranti Ltd's transformer factory at Hollinwood

Lighting Large Factory from Height of 64 ft

ILLUMINATING engineers will readily appreciate many of the difficulties involved in lighting a large factory occupying a floor space of about 4½ acres and with ceiling heights of 64 ft and 40 ft. Examples of such installations are not prolific and consequently it is well worth mentioning the scheme adopted at Ferranti Ltd.'s new transformer factory at Hollinwood. This installation, carried out by Metropolitan-Vickers Electrical Co., Ltd., has been spread over three years. A number of preliminary tests were carried out bearing a number of important factors in mind. A high value of vertical illumination was necessary and it was vital to see easily into the many recesses in the structures. Colour discrimination was essential. To clear overhead travelling cranes, high mounting heights had to be considered and whilst trying to keep the number of fittings to a minimum, account had also to be taken of the shadows the cranes would create if too few lamps were installed.

Three schemes were considered: a blended light scheme of 400 W mercury discharge lamps and 1,000 W tungsten filament lamps; a cold cathode scheme using 3-tube 9½ ft units; and a hot cathode scheme of twin lamp 8 ft 125 W units. The first was quickly abandoned, and the third eventually decided upon chiefly because of robustness in the face of vibration from five cranes.

Installation was planned for an average of 15 lumens per sq ft and 1,800 lamps were used mounted in heavy gauge metal trough reflectors with upward light slots. Each unit had a separate 3-pin plug and socket to facilitate speedy cleaning and overhaul.

Children's Electric Cooking Contest

AT Faraday Hall, St Austell, on Saturday, twelve school children will be competing in the finals of the Children's Electric Cooking Competition organised by the Cornwall sub-area of the S. Western Electricity Board. There were hundreds of entries for this competition originally from schools all over the county and, after eliminating rounds, 51 competitors were selected to represent their schools in the semi-finals. Faraday Hall will be equipped with six electric cookers, each in its own cubicle, and the children will first prepare their meals on table in front of the hall. Points will be awarded for all aspects of preparation as well as the results achieved. Coinciding with the competition will be a demonstration of an automatic cooker. There will also be an exhibition of the latest electrical appliances. A competition for Young Farmers is also being held now within the area of the S. Western Electricity Board.

Manchester's Plan to Combat Air Pollution

PLANS for the gradual reduction of atmospheric pollution in Manchester have been submitted to the Ministerial Committee on Air Pollution, by the city's corporation, we learn. The proposals are based on experience gained during the past two years or more since a smokeless zone was established in central Manchester. Incidentally the city was one of the first to secure powers to set up smokeless zones and to control the emission of smoke from industrial furnaces. Five suggestions have now been put forward. In the first place it is advocated that the installation of smokeless appliances in new houses should be compulsory, and also that financial incentives be offered to encourage this. An extension of the corporation's powers to include existing furnaces as well as new ones is sought. It is also proposed that there should be large-scale production of cheap smokeless solid fuels. Finally development of a smoke abatement advisory service by local authorities should be encouraged.

The report, in which this five-point plan appears, goes on to review the success of the zone already established. Occupiers of premises within the 104-acre area had been most co-operative. The corporation is now awaiting confirmation of an order extending the zone to a further 130 acres. This area contains 517 premises with some 6,700 appliances, of which 5,120 are operated smokelessly, it is stated.

BIRMINGHAM ENGINEERING CENTRE OPENS IN JUNE?

THE Birmingham Engineering Centre is now expected to be opened officially in June. This permanent exhibition, details of which were given in our 1 Oct. issue, was to have been opened this month but final stand positions have not yet been completed. An announcement concerning the actual date and the Minister to perform the ceremony is expected soon.

Among exhibitors who have reserved space at the Centre are: Barlow-Whitney Ltd., Bill Switchgear Ltd., Brentford Transformers Ltd., Dewrance and Co., Ltd., Donovan Electric Ltd., Electrical Dynamic Construction Co., Ltd., Foster Instrument Co., Ltd., Hackbridge and Hewittic Electrical Co., Ltd., Hopkinsons Ltd., Hortsmann Gear Co., Ltd., Ioco Ltd., Kelvin and Hughes Ltd., Lancashire Dynamo and Crypto Ltd., Lansing Bagnall Ltd., Murex Welding Processes Ltd., R. B. Pullin and Co., Ltd., Rowe Bros. and Co., Ltd., Santon Ltd., Simplex Electric Ltd., Herbert Terry and Co., Ltd., Worthington Simpson Ltd., Wright Electric Motors (Halifax) Ltd.

Free Fires for 8,000

ELECTRIC fires which do not conform to the new safety regulations are being offered free to some 8,000 consumers in the N.W. Electricity Board's area. Previous hiring arrangements will cease to operate on 30 June next, and those in possession of the fires have been told they can keep them without paying any further rent. The Board feels it would be unfair to withdraw the appliances, but strongly advises persons keeping them to have a more adequate guard fitted. The Board does not feel it could accept responsibility for the fires.

The First Half-Century

Somebody has tried to do away with printers' ink. The unnamed inventor had no desire to abolish printing but proposed to print electrically, and it would seem there was financial support for the venture if it could be made practicable on a commercial scale. The idea was to pass a current through the (uninked) type and the moistened paper and thus decompose a salt in the latter. The inventor tried nitrate of silver but this was not attractive for several reasons—one was expense. The chemist was called in to find a cheap salt giving a permanent black deposit when wanted and never at any other time. There seems to be one competent element, and he found it in manganese. Unfortunately it was also discovered that manganese sulphate put into the pulp was washed out later in the paper-making process, whilst it was imperative to use a highly soluble salt. The chemical problem being solved it only remained to redesign the paper-making machinery to correspond to the chemistry. At this the capitalists pulled up, and electric printing will continue to mean merely the driving of a press with an electric motor.—*See our issue of 24 March, 1904.*

Sales Promotion Efforts in Scotland during 1954

A REPORT reaching us from Scotland tells of an intensive sales drive in domestic electrical appliances, the object of which is to make 1954 an outstandingly successful buying year. Evidence certainly seems to bear this out. Only a fortnight ago we mentioned in these columns the Contemporary Cooker Design Exhibition staged by the S.E. Scotland Electricity Board in Edinburgh. This successful display has stimulated an interest, the results of which will probably become more apparent later. Apart from the Board, however, many prominent firms are indulging in special promotional activities. One, with a number of showrooms, is running a series of demonstrations, and currently featuring the dishwasher. Another is paying special attention to washing machines, and a third is having a week of demonstrations of the same type of appliance. These, we are informed, are typical examples which can be multiplied many times throughout the country each week.

The impression given is that an intensive effort is being made to drive home the advantages of electricity, and the drive is meeting with considerable success, despite the admitted problems of scarcity of money. The latter fact has, of course, tended to increase hire purchase trading. Our informant tells us that washing machines are outstandingly popular and selling steadily, whilst special efforts are being made to boost sales of cookers, foodmixers and dishwashers.

Electrical Fittings aboard Royal Yacht

THE Royal Yacht *Britannia* is much in the news just now. It is therefore appropriate to record some of the electrical equipment aboard. This includes the lighting fittings, all of which were supplied by the G.E.C. We are informed that about 20 special designs, mainly decorative, were prepared in conjunction with the architects responsible for interior decoration. Total number of fittings supplied was 253. In addition 25 floodlights have been provided for the illumination of the funnels, masts and upper deck.

The same company has also supplied the ship's telephone exchange switchboard which is designed for cordless operation. Calls and operating sequences are signalled by lamps, and connections effected by key switches. Usual ship to shore facilities are provided.

Dirty Work in the Edgware Road

WHEN a member of a bank robbery gang threatens to "split" to escape complicity in a possible murder charge, things happen very quickly. That is the story of "Madam Tic-Tac," a drama presented by the G. E. C. Dramatic Society at the Fortune Theatre last week. In the title role as the blind and deaf cafe proprietor and leader of the gang, Miss F. Scantlebury played her part magnificently. Special mention is also due to Miss D. Webb, who portrayed Marguerite with the aplomb of a pro. In fact, all the members of the cast, and others concerned, thoroughly deserved the enthusiastic applause for their performance in this stirring play. Incidentally, all the receipts at the shows went to the E.I.B.A.

Music for All

ONCE again celebrities of the London Electricity Board joined with other music lovers at the St. Pancras Town Hall, N.W., for another "Music for all" concert by the L.E.S.S.A. Music Society.

Mr and Mrs H. J. Randall, Mr I. J. Hayward (L.C.C.) and Mr L. H. Welch were there when Leslie Atkins opened the programme conducting Weber's "Der Freischütz." Douglas Sharpe was co-conductor. Works included songs by Handel, Beethoven's First Symphony, and "Die Fledermaus."

Trophy for After-Sales Radio and TV Service

A TROPHY for most efficient after-sales service is being offered to dealers of E. K. Cole Ltd.'s radio and television sets. Dealers have been sent an entry form, a questionnaire and an explanatory leaflet. Object of the award, which will be made annually, is to encourage dealers to provide an efficient all-round after-sales service, which it is hoped will stimulate further sales. Winning dealers will be allowed to keep the trophy for a year, after which a small-scale replica will be presented. Supplementary prizes will be given to the chief engineer and three nominated assistants. The competition will be organised in five areas corresponding with the five main television districts. Entry forms should be returned by the end of this month and questionnaires by the end of April.

Charges for Street Lighting Criticised

A COMPLAINT that charges for street lighting were excessive came before the Midlands Electricity Consultative Council at their meeting last week. It was moved that the Council should press for reduced charges so that "the most important of all public services could be run as economically as possible." The proposition was withdrawn in favour of an amendment asking that the whole question of street lighting charges should be referred to local committees of the Council for their investigation and observations.

"LIVING ELECTRICALLY"

A SPECIAL supplement entitled "Living Electrically" is being included in next month's issue of *Good Housekeeping*. The magazine has attempted to give a comprehensive review of what the electrical industry is doing to help the housewife achieve her perfect home. Arranged in sections, this 24-page supplement contains articles on an all-electric kitchen, cleaning by electricity, heat and hot water, electricity about the house, for personal service, and electricity out of doors. The magazine is providing a special display for showrooms and retailers. Electricity showrooms and about 800 selected retailers in large towns are being sent a special showcard, poster and an advance copy of the issue for publicity purposes.

Additions to Heaton Works

EXTENSIONS at C. A. Parsons and Co., Ltd.'s Heaton Works, Newcastle-on-Tyne, will enable that company to build 400,000 h.p. turbo-generators, we hear. The new factory is to be about 80 ft high and will include a 200-ton crane and two 40-ton cranes. It is expected to be completed by the end of this year.

NEWS IN BRIEF

Manchester College of Technology is to be raised to independent status ranking second only to the Imperial College of Science and Technology.

The c.s. *Monarch* is to undergo a refit. Her bows are to be altered to enable her to lay the submarine cable across the Atlantic.

Fifth international gathering of associates and distributors of the Driver-Harris Organisation will be held from 11 to 14 May at Alderley Lodge, Cheshire.

Just published by the Instrument Society of America are the 1953 *Proceedings of the Society*, containing 74 technical papers presented at the Instrument Congress in Chicago last September.

Annual dinner and dance of the Manchester Association of Engineers has been held at the Grand Hotel. About 330 members and guests attended.

Simplex Electric Co.'s Creda Unit Type Ranges are used extensively at the R.A.F. school of cookery at the Boy Entrants Establishment at Cosfold, Staffs.

Nearly 140 guests attended the annual dinner of the E.C.A.'s Bradford branch recently.

The Portland Players of the B.E.A.'s sports and social club are presenting "Night Must Fall" at the Duthy Hall, Southwark's Municipal Theatre, on 31 Mar. and 1 Apr.

Electric Film Show

Some tickets still remain for the viewing of American electrical films of an educational and technical character at the cinema of the U.S. Information Service in Grosvenor Sq, London. The film shows will be held on the first Tuesday of Apr. and May at 6.30 p.m. Application should be made to Mr P. A. Thorogood of the A.S.E.E., at 35 Gibbs Green, Edgware.

QUESTIONS IN PARLIAMENT

Rural Supplies

ELECTRICITY supply authorities were planning to take supplies to all but the most remote premises by the extension of spur lines from the more populous and remunerative areas in a co-ordinated network, Mr L. W. Joynson-Hicks stated in a written answer. He again assured the House that both the B.E.A. and the Government were fully alive to the need of pressing on with rural electrification. Mr A. R. Hurd had asked what steps were being taken to carry power to districts where costs of connections were exceptionally high.

B.E.A.'s Fuel Consumption

THE increase (expressed as a percentage) of coal and oil used by the B.E.A. and N. of Scotland H. E. Board in January, 1954, over January, 1953, was queried by Col R. S. Clarke. He was told that the respective increases were 3·7% and 56%, and he then asked the reason for the greater proportional increase in the use of oil. Mr L. W. Joynson-Hicks explained that it was the small amount of oil consumed, which totalled less than 1% of power stations' fuel consumption.

Grants for Research

AN explanation concerning grants made for industrial research was given by Mr J. R. Bevins in a written reply. The matter was raised by Mr A. H. Allan who asked to what extent the increase of £400,000 in D.S.I.R.'s Vote would be used to restore cuts made in 1952 in grants for industrial research associations. Mr Bevins said rates of grants were re-assessed every five years, and there was no general reduction in 1952 although some associations due for re-assessment received stiffer terms for the ensuing period. Compared with estimates for the current year, estimates of the D.S.I.R. for 1954-55 provided for an extra £91,500 for research associations, he added.

Royal Assent

THE House was informed on Thursday that Royal Assent had been given to the Rights of Entry (Gas and Electricity Boards) Act, 1954, and the Development of Inventions Act, 1954.

B.I.F. Bill

A NUMBER of matters were elucidated when the British Industries Fair (Guarantees and Grants) Bill was considered in committee last week. Mr D. Heathcoat Amory explained that the purpose of guarantee was to provide working capital in London. Five years was the maximum period for which the guarantee was given. The company was not wholly responsible for running the London section, it had also to co-ordinate the London and Birmingham sections. On the question of one large permanent home for the Fair in London, he said it was impossible to have that at present but the proposition was not out of the question for the future.

Bankside Station

SOME of the details of technical advice offered to the Minister of Housing prior to the construction of Bankside power station were given by Mr E. Marples for the benefit of Sir H. Williams. He said the report advised that sulphur and other noxious fumes could be eliminated, but experiments with a pilot plant should be carried out first to find the most effective method. As a result a gas washing plant was designed and installed. Sir H. Williams alleged that the plant brought down more sulphur than if it had not been installed. Mr Marples replied that there was some discrepancy on that point. Average efficiency of the plant between July and September last was 97·2%, he said, and 97.7% between October and December.

Atomic Plant at Dounreay

IT WAS too early yet to give any detailed information on the construction of the Dounreay atomic energy plant, said Sir D. Eccles last week. It was an adventure into unexplored territory, he said. Replying to a number of questions by Mr G. Nabarro, Sir David said the construction of the plant was expected to take four to five years and the cost may be about £15 million. As regards the last figure, he said it was too early, because of developments which might be included in the design, to give a definite sum. For similar reasons he could not estimate the output of electricity.

Atomic Energy Bill

LAST week also the Atomic Energy Authority Bill was considered in committee. The first point raised concerned the number of members of the Authority which it was suggested be raised to seven. A number of suggestions were made as regards the composition of the Authority including a representative of the electricity supply industry. This and the various claims on behalf of Government Departments as the body responsible for the Authority were considered together.

Mr A. Palmer moved that one member should be a person with wide experience in the generation and supply of electricity and that he should be appointed after consultation with the Minister of Fuel and Power.

Replying, Sir David Eccles pointed out that it would be unwise to stipulate any one section of the electrical industry or any other industry or profession. It appeared better to obtain the fullest co-operation of electricity authorities towards the advancement in that form of power. Already, he said, B.E.A. representatives were working at Harwell and Calder Hall. It was necessary, he said, to associate electricity experts with that section of the Authority's work and the same would be done for other sections of the industry. The amendment was subsequently withdrawn.

Atmospheric Pollution

ARISING no doubt from the recent debate on air pollution, a number of questions were asked on the subject last week. Mr E. Marples, in his replies, said the Committee on Air Pollution expected to submit a further report in the summer. Interim recommendations made a short time ago asked for fuller measurements of pollution and for more research into pollution by sulphur compounds. These were being studied, Mr Marples said. The Minister agreed that the establishment of smokeless zones was a useful contribution to the problem and he was ready to consider proposals for further zones among local authorities already possessing the necessary powers.

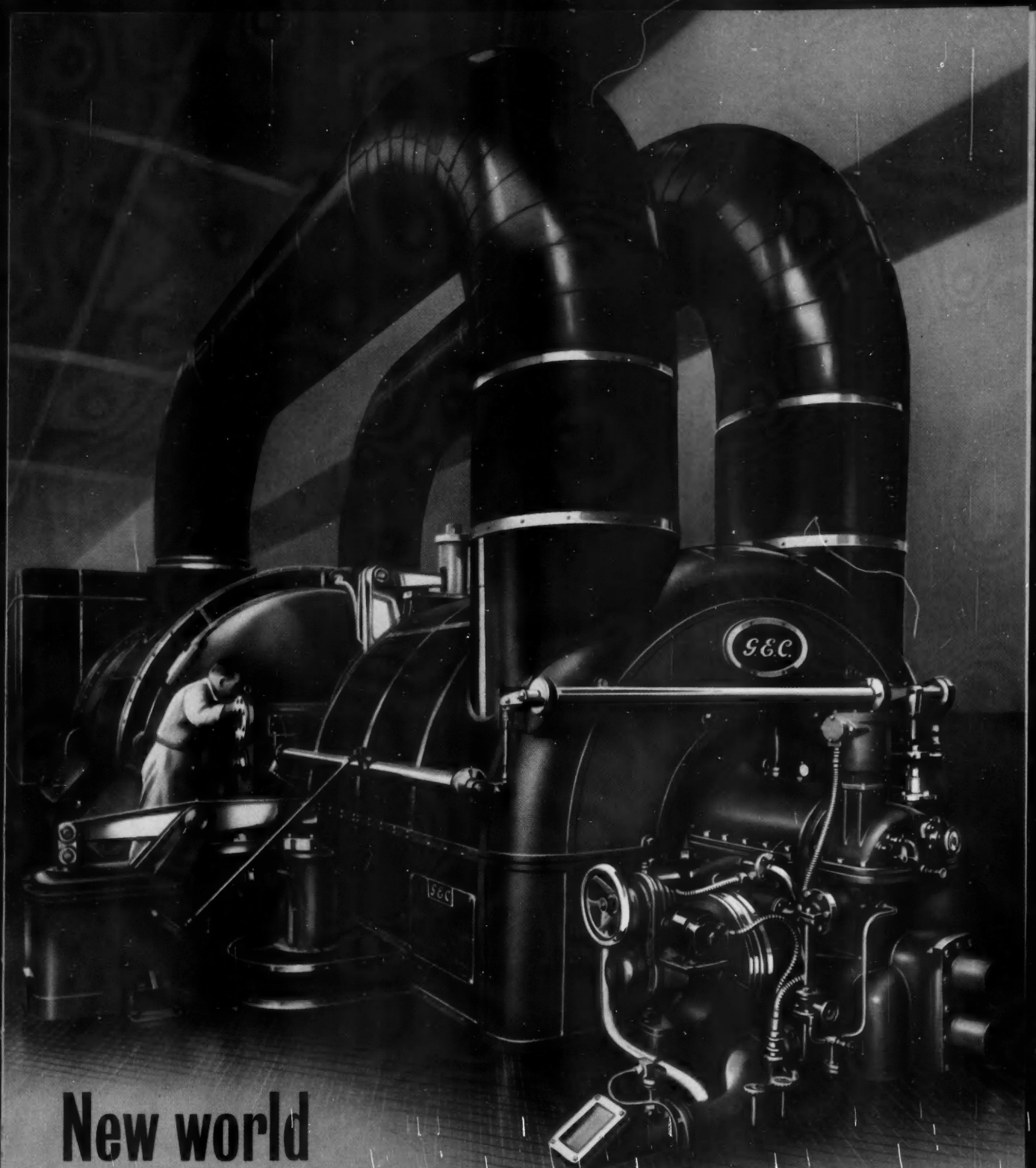
Pollution Readings

A TABLE showing details of deposits resulting from air pollution during the last five years at particular localities in England were published in *Hansard* following a question in the House on Friday. Mr Ellis Smith asked for the total tons per square mile of insoluble deposit, soluble deposit and total solids at stations where measurements were taken. Details were given of readings at ten stations in all, two each at Stoke-on-Trent, Manchester and Southport, and at Bolton, Stretford (Trafford Park), Salford and Urmston. Readings had been taken over periods of between 41 and 60 months.

Dalmarnock Failure

EFFECT on employment of the power failure at Dalmarnock was the subject of a question on Monday. Mr J. Carmichael asked for a statement on the number of man-hours lost to industry during the week when Dalmarnock power station was unable to supply light and power to a large part of Glasgow. In a written answer Sir W. Monckton, Minister of Labour, said precise information was not available, but the total number of workpeople who lost some working time as a result of the interruption of electricity supplies during the week was about 30,000. Some lost only one day's work, he said, while others lost two or three days. The Minister added that by the Thursday, the output of the power station had been restored to about 75% of normal.

The failure at Dalmarnock power station took place during the week ending 6 Mar., and was briefly reported in our issue of 4 Mar.

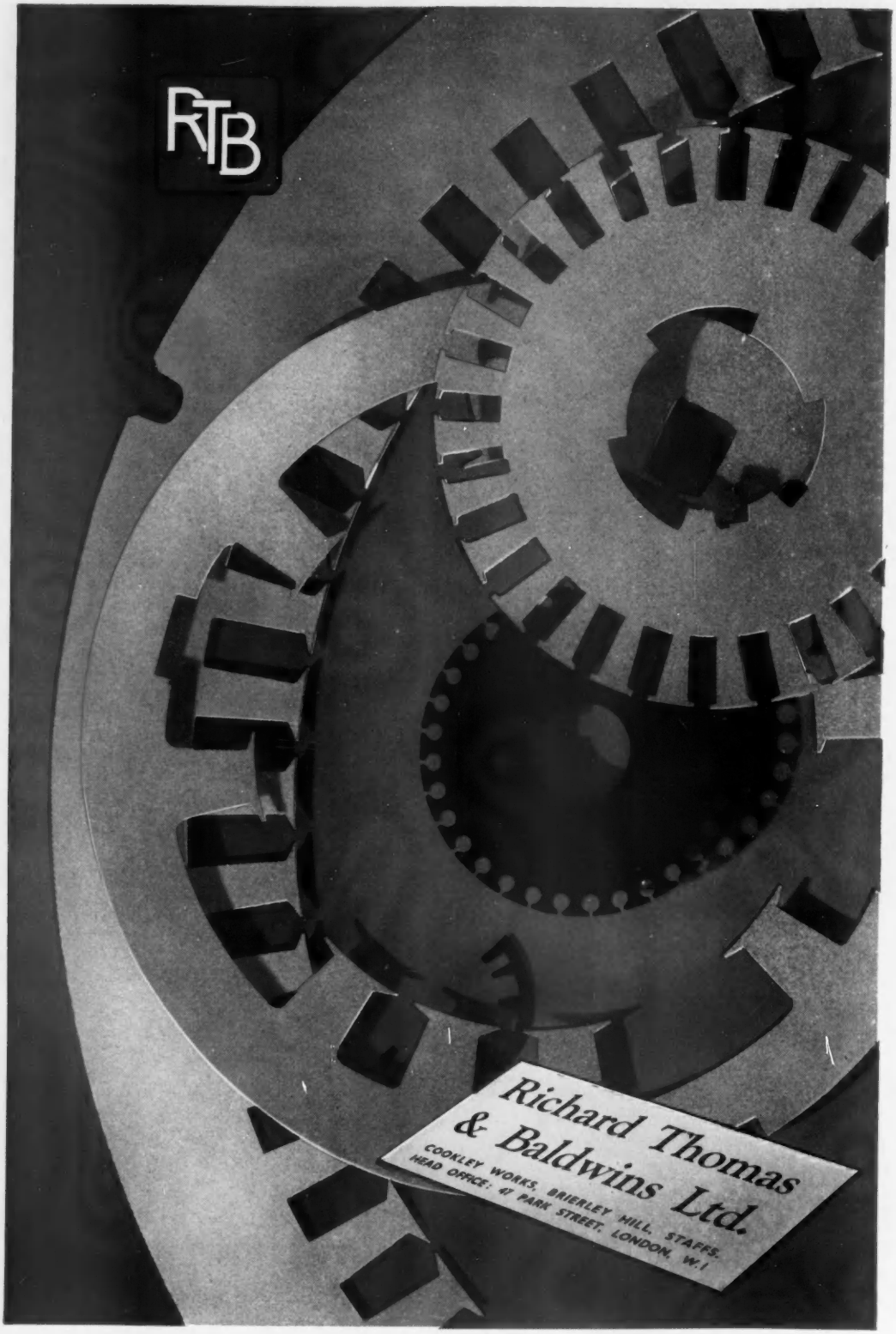


New world efficiency record by G.E.C.

The 60,000 kW hydrogen-cooled turbo-alternators recently installed at Uskmouth Power Station, Newport, Mon., are achieving the highest efficiency ever known for power generators of this size operating at a steam pressure of 900 lb. per sq. in. and at a steam temperature of 900° F.

The heat consumption figure at full output officially confirmed by the British Electricity Authority is 9,027 B.Th.U. per kWh.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2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COOKLEY WORKS, BRIERLEY HILL, STAFFS.
HEAD OFFICE: 47 PARK STREET, LONDON, W.1

ELECTRIC SUPPLY NEWS

Battle

TO extend electricity supplies to 47 dwellings in the Ship Street Lane district of Etchingham would cost £6,500, members of the Battle District Association of Parish Councils were told by Mr E. S. Hatley, district commercial engineer, South-Eastern Electricity Board, Hastings. He was replying to points raised by the Etchingham Parish Council representative who wanted the extension made to that area and said they had been engaged in correspondence on the subject for two years. They felt they should not have to bear the cost of high tension cables and transformers. A way has been found to meet that cost, Mr Hatley said. On the basis of a canvass they had promises of £2,700 towards the cost, leaving a deficit of £3,800. Revenue per house was estimated at about £5. 10s. annually, but if electric cookers and water heaters were installed, the increased revenue would help. He agreed to suggest to the Board that a further canvass be undertaken.

Cockermouth

THE Rural Council Planning Committee has appealed to the Lake District Planning Board to consider the supply of electricity to Borrowdale as an urgent need. The Board are at present studying a draft development plan for Lakeland National Park.

Cumberland

THE County Council has approved proposals by the North-Western Electricity Board for the construction of an 11 kV line between Distington and Branthwaite via Gilgarran, with a low voltage line to supply Gilgarran village and also low voltage lines to High Laws, The Hill, Abbey Cowper, Scarfoot, Brownrigg and Plumpton.

Douglas (I.O.M.)

DURING the course of his review of the Town Council's estimates for the ensuing year, the borough treasurer, Mr A. L. Costain, said that a fall in output of electricity was the main reason for the Electricity Committee's decision to revise tariffs as from January last. The aftermath of the severance of supply to the Isle of Man Electricity Board was still with them and there would be at last three more difficult years before the undertaking could hope to achieve again the financial equilibrium patiently built up over the years and so needlessly destroyed in 1950, he said.

Durham

THE following proposals submitted by the North-Eastern Electricity Board have been approved by the County Planning Committee:—l.v. overhead line to supply Little Stainton, near Darlington; l.v. o.h. line to supply Aislaby, near Yarm; similar line to supply 115 properties at Marley Hill; erection of 20 kV o.h. line in connection with the transfer of the network at Blackhall Colliery from the N.C.B. to the Electricity Board system; erection of 20 kV line to provide a h.v. supply to 529 houses and other properties at West Simonside, South Shields; erection of 20 kV o.h. line and reconstruction of existing l.v. network at Witton Gilbert; l.v. overhead line and reconstruction of existing network at South Hetton; erection of 20 kV line to supply 86 houses at Evenwood; and l.v. line and reconstruction of existing network at Ewehurst.

Isle of Man

THE Governor of the Island has appointed Sir William Robinson and Mr W. J. Girvan as arbitrators in the claim of the Douglas Corporation against the Isle of Man Electricity Board for compensation for the Board's having ceased to take a bulk supply from the Corporation. Sir William Robinson and Mr. Girvan also constitute the Commission which the Governor set up after Tynwald had asked for an investigation into the generation and transmission of electricity in the island.

Kingsteignton

A complaint that overhead poles, wires and cables made the Exeter Road area in an unsightly condition was made at the Kingsteignton parish meeting recently. But after two members had pointed out that the cost of placing such cables underground was truly prohibitive, the chairman ended the discussion by saying there was only a faint hope of the matter being rectified if the Rural Council considered the cost prohibitive.

Sayings OF THE WEEK

"We must continue to devise more efficient methods of production and the workpeople must in their own interests make every effort to produce maximum outputs. Our customers must also collaborate with us by accepting established standards" . . . SIR GEORGE NELSON, chairman of the English Electric Co., Ltd., at the annual general meeting.

"The general standard of lighting in many schools is little short of scandalous" . . . MR A. E. TURVILLE, president of the Association of Optical Practitioners.

"It seems inequitable that under a hire purchase contract a private individual cannot obtain relief of income tax in respect of the interest element in the charges" . . . MR G. R. RIDLEY, in the *Financial Times*.

Lakeland

AT a meeting at Carlisle of the North-East Lakeland District Committee of the North - West Electricity Consultative Council, it was announced that work would begin in twelve months' time on a £225,000 scheme for supplying electricity to the Ivegill area. It was stated that the scheme would take three or four years to carry out and about 400 premises including 200 farm buildings would be supplied with energy.

Settle

WHEN the Rural Council were discussing a proposal of the Yorkshire Electricity Board to take an overhead power supply into Littondale, a noted dale in Craven, the question was raised whether the lines should not be placed underground in areas of high amenity value. The Council accepted a recommendation of the Plans Committee that, if possible, the line should be laid underground, preferably over the whole length, or alternatively that the supply in the villages of Arncliffe and Hawkswick should be underground, and failing that, the line at Arncliffe should be underground. Representatives of the Council and the Board are to discuss the matter.

Suffolk

OVERHEAD power cables are causing interference to television reception. This was alleged at the first meeting of the Haverhill Televiewers Club last week when it was decided to make representations to the Eastern Electricity Consultative Council in an effort to have o.h. cables in the town placed underground. It was suggested that this was the only real solution to the bad reception and excessive interference caused by the existing o.h. cables. The secretary, Mr C. Baldry, said that since their inaugural meeting they had approached the Eastern Electricity Board on the matter, and the Board had been good enough to treat the cable with some mixture which, for a time, certainly had a good effect on reception. But the improvement was only of temporary duration and, after about a week, interference was as bad as ever.

LIGHTING SCHEMES

Belfast. This city, which has over 17,000 gas street lamps, is experimenting with fluorescent lighting in Donegall Square North.

Douglas (I.O.M.). It is proposed to convert the remaining gas street lighting to electricity during the coming year. Esimated cost is £13,000.

Dunfermline. The T.C. has allocated £1,061 for improved street lighting in Rosyth.

Portrush. The U.D.C. has under consideration a scheme for fluorescent lighting throughout the town, to cost about £21,000.

Rochdale. Consent has been received to the borrowing of £4,600 for improved street lighting on Ashfield Rd, New Barn Lane, and Shawclough Rd.

COMPANY ACTIVITIES

SIR GEORGE NELSON, the chairman of the English Electric Co., is to be congratulated for throwing light on an order situation which is all too confusing to those outside industry. He referred in his annual speech to the rise and fall in heavy capital goods orders. Shipments, he said, were up to the 1952 level, but similar incoming overseas orders had not been so great as in former years. "We must not get too depressed at this occurrence," said Sir George, "for, from time to time an overseas country wishing to purchase capital plant may reach the limit of its immediate financial resources." Sir George suggested that these conditions obtain in several countries today.

In such circumstances it is not sufficient to prove superiority of design and skill incorporated in British goods. "We may have to offer financial help to meet such countries needs to reach a greater degree of self-sufficiency in their secondary industries, as part of their general plan for paying their way in the world." It can also be understood that when a country installs heavy electrical equipment or power plant, etc., it must have time to absorb it and for demand to catch up with capacity before putting in fresh orders. And in any case, heavy equipment, unlike many consumer goods, is built to last.

As far as English Electric goes, orders already received will ensure the maintenance in 1954 of last year's record production. Home orders booked in 1953 actually exceed those of the previous year. Sir George Nelson did not overlook another important reason for the decline in orders. There is now a terrific competition from other countries, especially Germany and Japan, which has led to prices and contract conditions which make it much less attractive for British business. Perhaps Mr Butler, in his Budget, will help British exporters to compete more readily by encouraging more capital investment and greater income tax concessions on new plant.

A pygmy, compared with English Electric is Cecil A. Mathes' Bylock Electric Co., which specialises in the manufacture and distribution of household and industrial electrical appliances. But it is a fine upstanding youngster with a turnover for the year to July last, about 20% up, at a record level, in spite of the difficulties of that particular year. But despite the greater production, sales did not increase fast enough to offset the effects on trading profits of rising costs and more intense competition.

Mr Mathes has now got the extra accommodation he has been trying for some time to get. With a very healthy order book, he has increased the dividend from 16⅔% to the equivalent of 20% despite a fall in profits. He would like to see wage packets increased in size, but this is only possible if output per hour is increased, so that products may sell competitively. "The fight for world markets," he adds, "is becoming more and more acute, and there is no prospect of rising price levels overseas."—*From our City Correspondent.*

British Insulated Callender's Cables Ltd.

This concern is taking up $2 million of a further $3 million of Common Stock being issued by Phillips Electrical Co. (1953) Ltd., the Canadian affiliate of the B.I.C.C. group. The balance of $1 million will be sold in Canada. The additional finance is needed to carry out an expansion of the present production capacity, the manufacture of further products and an increase in efficiency through improved facilities and lay-out.

Bylock Electric Ltd.

During the year ended 31 July last, turnover was a record for the company, but this, and the introduction of new models, brought production problems. Fortunately additional accommodation has now been obtained, where production will shortly be running at a substantial level, Mr C. A. Mathes, the chairman, states. A large proportion of the company's trade is concerned with export, principally to the dollar areas, but Mr Mathes warns that the fight for world markets is becoming more and more acute and there is no prospect of rising price levels overseas. The order book, however, is in a very healthy position, and he is confident that the difficulties will be overcome satisfactorily.

Year to 31 July	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	27,259	8,120	98	—	7/6	3/9
1950	13,513	292	3	—	4/11	2/9
1951	40,013	8,496	107	50	5/4	3/1
1952	30,388	8,476	105	50	6/6	2/9
1953	27,439	4,057	16*	20	6/7	1/10

*on increased capital

Croft's Engineers (Holdings) Ltd.

It is stated that the Capital Issues Committee has given permission for a one-for-one scrip issue.

English Electric Co., Ltd.

The orders in the company's books ensured the maintenance of the 1953 volume in 1954, Sir George Nelson, chairman, stated at this meeting. But whilst home orders in 1953 as a result of the marketing of new products, exceeded those of 1952, competition from overseas manufacturers in the export markets for well established products had greatly increased, prices and contract conditions were much less attractive, and the volume of orders for export markets in 1953 had fallen by comparison with 1952, he added. This drop in orders was probably due to some countries reaching the limit of immediate financial resources, although wishing to purchase capital plant. Such conditions obtained in several countries today, and it was necessary to study in what way they could be helped in their problems.

Hoffmann Manufacturing Co.

For 1953, the group profit is £1,117,024, as against £1,469,061 for the previous period. There is a final dividend of 10%, tax free, plus a bonus of 5%, making a total distribution of 20%, tax free, compared with 17½% a year ago. The directors state that during the year the company sold its investment in Norma-Hoffmann Bearings Corpn. of America resulting in a surplus of £286,685, which has not been included in the profit figures.

Newman Industries Ltd.

For the year ended 31 Dec. last the trading profit and other receipts amounts to £169,734—which is just over £9,000 lower than the figure for the previous year. After allowing all charges, including taxation, the balance remaining is £24,611 (*£19,911*), according to the preliminary statement. The dividend is again 10%. Taxation takes only £62,600 this time as against £71,000 allowed in the previous year.

G. D. Peters and Co., Ltd.

After allowing all charges, including taxation, the net profit for the year ended 31 Dec. last is £75,065. The corresponding figure for the previous year was £86,976. There is a final dividend of 12½% again making a total of 20% for the year.

Richardsons Westgarth and Co.

The directors propose to make a one-for-three scrip issue, by capitalising £442,340 from reserves. The capitalisation, it is stated, bears no implication as to the amount which will be paid out as dividend. This will be decided having regard to trading results and the need to plough back substantial sums to finance future expansion.

Shawinigan Water and Power Co.

Sales of electricity for 1953 totalled $38,800,816, an increase of 3·3% over 1952. Operations for the year resulted in a net profit of $5,952,564 compared with $5,193,501 for the previous year.

Switchgear and Cowans Ltd.

After allowing all charges, including taxation, the net profit for the year ended 31 Dec. last is £18,804, compared with £29,009 for the previous year. The dividend is cut to 10%. For 1952 the dividend was 20% plus 2½% bonus.

Dividends Declared

Nigerian Electric Supply Co. Interim of 4% (*same*).

E. K. Cole Ltd. Interim of 10% (*same*) but on larger capital.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders, unless otherwise stated.

26 Mar.—Belfast T.C. Two sets of central evaporating plant for power station West.—Advertised in 28 Jan. issue.

26 Mar.—Belfast T.C. Automatic water jet fire fighting and alarm installation at power station West.—Advertised in 25 Feb. issue.

26 Mar.—Belfast T.C. L.T. switch-fuse distribution board.—Advertised in 4 Mar. issue.

26 Mar.—Erpingham (Norf.) R.D.C. Two electrically driven submersible type borehole pumps, etc., for Matlaske/Holt water supply.—See 4 Mar. issue.

26 Mar.—Lees U.D.C. Group B street lighting in Stamford Rd, and St. John St. Also in Spring Lane and Thomas St. —See 11 Mar. issue.

26 Mar.—Liverpool. Distribution supply services for mental deficiency colony at Greaves Hall, Banks.—See 11 Mar. issue.

26 Mar.—N. Ireland. Installation at Fever Hospital, Purdysburn. — See 11 Mar. issue.

28 Mar.—Gloucester T.C. Electrical installation in fire station in Eastern Ave. Apply to City Architect, Suffolk Hse, by above date. Deposit £2. 2s.

29 Mar.—Gravesend T.C. Rewiring and equipment at Public Library.—Advertised in 11 Mar. issue.

29 Mar.—Manchester T.C. Installation in public wash-house, Openshaw.—Advertised in 4 Mar. issue.

29 Mar.—Manchester T.C. Installation at central stores, Newholme. — See 11 Mar. issue.

29 Mar.—N. Ireland. Installation at Downshire Hospital, Downpatrick.—See 18 Mar. issue.

29 Mar.—Todmorden T.C. Sodium street lighting along Leeds-Halifax-Preston Rd. —Advertised 18 Mar. issue.

30 Mar.—Godalming T.C. Installation in 304 houses on Farncombe estate.—Advertised in 11 Mar. issue.

30 Mar.—Southgate T.C. Equipment for street lighting scheme. — Advertised in 11 Mar. issue.

31 Mar.—Durham. Installations in six schools.—See 18 Mar. issue.

31 Mar.—Eire. Installation at Grangegorman mental hospital.—See 18 Mar. issue.

31 Mar.—Huddersfield. Installation at Colne Valley Co-op. Federated Bakery Ltd.—See 18 Mar. issue.

31 Mar.—Manchester T.C. Conversion of 3 cwt hydraulic service lift to 8 cwt automatic electrically controlled hydraulic lift at Town Hall. City Architect, Town Hall. Deposit £1. 1s.

1 Apr.—N. Ireland. Electrical installation at Bangor Technical School. A. W. Gordon Holt, consulting engineer, 74 South Pde, Belfast.

2 Apr.—Monaghan (Eire). Two electrically-driven pumping units.—See 18 Mar. issue.

3 Apr.—Castle Ward R.D.C. Electrical installation in 54 houses at Heddon-on-the-Wall. G. Edgar-Dimmack, Engineer and Surveyor, North Rd, Ponteland. Deposit £2. 2s.

3 Apr.—Durham. Electrical equipment and tools for Hebburn New Technical College. Director of Education, Shire Hall.

3 Apr.—Durham T.C. Supply of electrical engineering laboratory equipment and similar items for Hebburn New Technical College. Director of Education, Shire Hall.

3 Apr.—Eccles T.C. Installation in 306 dwellings in Brookhouse estate. Advertised in 18 Mar. issue.

3 Apr.—Edinburgh T.C. Rewiring at Gorgie Markets. City Architect's Office, High St.

3 Apr.—Long Eaton U.D.C. Sewage pumping machinery.—See 11 Mar. issue.

3 Apr.—Manchester T.C. Electrically driven screwing machine for tubes and bolts ½ in. to 3 in. diameter. Secretary, Waterworks Offices, Town Hall.

3 Apr.—Newbury (Berks) R.D.C. Wiring 210 council houses.—See 11 Mar. issue.

3 Apr.—Newcastle-on-Tyne T.C. Installation at Rutherford grammar school.—See 11 Mar. issue.

5 Apr.—Birkenhead T.C. Electrical machine tools for Passenger Transport Dept.—See 18 Mar. issue.

5 Apr.—Newcastle-on-Tyne T.C. Installation in N. Fawdon primary school.—See 11 Mar. issue.

5 Apr.—Southport T.C. Electrical installation in erection of day nursery in Talbot St. Borough Architect, 95-105 Lord St. Deposit £1. 1s.

6 Apr.—Kingston-on-Hull T.C. Electrical installation at Longhill primary school. City Architect's Department. Deposit £1. 1s.

6 Apr.—Newcastle-under-Lyme T.C. Street lighting installations in group A along two stretches of roads.—Advertised in 11 Mar. issue.

7 Apr.—Co. Down. Installation at Cregagh New Clinic.—See 18 Mar. issue.

9 Apr.—Belfast T.C. Heating and ventilating plant for 33 kV switch-house at power station West.—Advertised in 4 Mar. issue.

9 Apr.—Glasgow T.C. Accessories for lighting dept., in year from 1 June.—See 18 Mar. issue.

9 Apr.—Surbiton T.C. Improved street lighting comprising 140 W sodium units on concrete columns along Kingston Rd. R. Thirlway, Borough Engineer and Surveyor, Council Offices, Ewell Rd.

10 Apr.—Manchester. Electrical equipment, including impulse generator, transformer and instruments, for extension to Municipal College of Technology. The Registrar, College of Technology, Manchester.—Advertised in this issue.

12 Apr.—Bromley T.C. Improved street lighting along Westmoreland, Hastings and Tweedy Rds and Bromley Common comprising about 2½ miles of sodium and 270 yds fluorescent group A lighting. Borough Engineer, Municipal Offices. Deposit £2. 2s.—Advertised in this issue.

12 Apr.—Harwich T.C. Five sets of sewage pumps, two comminutor sets and ancillary equipment at Fernlea Rd station.—See 4 Mar. issue.

13 Apr.—Knaresborough U.D.C. Street lighting for part 2 of Meadowside scheme.—See 18 Mar. issue.

15 Apr.—Berwickshire. Installation in secondary school at Duns.—See 18 Mar. issue.

16 Apr.—Londonderry. Electrical installation at Magherafelt new intermediate school. County Educ. Architect, Whitehall Chambers, New Row, Coleraine. Deposit £3.

17 Apr.—Galashiels T.C. Supply, erection, wiring of 18 mercury vapour discharge lighting units in Channel, Market and Paton Sts. R. G. Nicholson, Lighting Inspector, Burgh Chambers.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 123 queries answered this week

"Difu'ite" metal louvre ceilings, makers of? J.A.C.—Metal Sections Ltd., Oldbury, Birmingham.

Alpha Machine Tools Ltd., makers of the lawnmower conversion units noted on page 317, address of? J.P.M.—Avenue Works, Southend Arterial Rd, Gidea Park, Romford.

"Balta" wall fires, makers of? E.M.E.—Berridge Aircraft Ltd., Berridge Rd West, Hyson Green, Nottingham.

"Safeguard" domestic appliances, makers of? T.E.—Safeguard Electrical Appliances (Dewsbury) Ltd., Old Anchor Works, Dewsbury.

"Grove" refrigerators, makers of? N.W.B.—Grove Eng. Co., Ltd., Butts Works, Barnoldswick, near Colne, Lancs.

Colour light time signalling device comprising 3 colours and 5 figures to be synchronised with an electric clock, makers of? G.C.P.—Julius Sax and Co., Ltd., 24 Commerce Rd, Brentford.

Neon indicator tubes ¼ in. diameter by ¾ in. long including caps and electrodes at each end, makers of? P.R.L.—We know of no firm producing this product as a standard item but the Neonelectric Co., Ltd., 24 Marshalsea Rd, S.E.1, are interested in making to order.

17 Apr.—Richmond (Yorks) R.D.C. Pumping plant.—See 18 Mar. issue.

21 Apr.—Fifeshire. Installation in High School at Kirkcaldy.—See 25 Feb. issue.

21 Apr. — Newcastle-on-Tyne T.C. Laundry equipment for flats in Hindhaugh St site.—See 18 Mar. issue.

26 Apr.—Gateshead T.C. Installation in Leam Lane primary school. Applications by 29 Mar.—Advertised in 18 Mar. issue.

No date stated—N. of Scotland H.E. Board. Supply of 33 kV switchgear and ancillary equipment for Mybster substation. Chief Electrical and Mechanical Engineer, 16 Rothesay Ter, Edinburgh. Deposit £2. 2s.—Advertised in this issue.

. . . and Overseas

Details of items marked may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

13 Apr.—U.S.A. Supply of main control board extensions, unmounted switchboard equipment and carrier-current equipment, for Bureau of Reclamation, Building 53, Denver Federal Centre, Denver, Colorado. Tender D.S. 4128. B.o.T. (Ref. ESB 6620/54)*.

20 Apr.—Uruguay. Supply of 164 items of electrical equipment including wire, cable, switches, circuit-breakers, stoves irons, fluorescent tubes, lamps, fans, etc., for Ministerio de Salud Publica. (Specif. No. 423.) B.o.T. (Ref.: ESB 6854/54)*.

21 Apr.—Uruguay. Supply of 3-phase 5 MVA transformer, of outdoor type, in oil bath, to be used as spare in essential services of generating plant. Tender No. 398/54, Specif. No. 2254. Usinas Electricas y los Telefonos del Estado. B.o.T. (Ref: ESB 6563/54).*

27 Apr.—New Zealand. Supply of 150 relays of power, mercury contact type, double-pole, non-locking, main contacts to make 15A at 250 V.a.c. with auxiliary single change-over 0·5 A contact, operating at 24-48 V d.c. Director-General (Stores Div.), G.P.O., Wellington. Tender P and T 150/6804. B.o.T. (Ref.: ESB 6593/54).*

30 Apr.—Australia. Brisbane City Council requires (Contract No. E.3/54) 24 manually operated outdoor, 3-phase, 400 A, 33,000 V, vertical break, ganged air break switches with operating mechanism. Dept. of Electricity, Kelvin Hse, Adelaide St. Copy at 10s. 6d.

16 May—Kuwait. Supply of 415 V distribution switchgear for phase 2 of 11 kV power distribution system. Dept. of Electricity. Govt. of Kuwait, Kuwait.—Advertised in this issue.

19 May—Australia. Supply of 11,000 V cable, 660 V cable, and 250 V control cable for Townsville Electricity Board. Specif. 403. State Electricity Commission of Queensland. Scottish Union Hse. 127 Eagle St, Brisbane, 10s. 6d. per copy. B.o.T. (Ref: ESB 5957/54).*

26 May—Australia. State Electricity Commission of Queensland invites tenders (No. 438) for 66,000 V transformers for Capricornia and Townsville Elect. Boards. Documents at office of Agent-General for Queensland in London.

1 June—South Africa. Supply erection of steam-raising, turbo-alternator and condensing plant for Municipality of Oudtshoorn. Consulting engineer, J. S. Clinton, P.O. Box 4684, Johannesburg. Deposit £5. 5s.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 23 March

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	236	+3	285
„ (3 months)	227½	+3	—
LEAD, refined pig, min. 99·97% purity (cash)	88½	+3½	93½
„ (3 months)	87½	+3½	89½
TIN, refined, min. 99·75% purity (settlement)	747½	+21½	942½
„ (3 months)	700	+20	936½
ALUMINIUM, ingots 99-99·5%	156	—	166
ZINC, virgin, min. 98% purity (cash)	75½	+2½	80½
„ (3 months)	74½	+2½	81½
RUBBER No. 1, RSS. spot (per lb)	16½d.	+⅛d.	21⅜d.
„ c.i.f. basis, ports. June (per lb)	16⅝d.	+⅛d.	21½d.
ARMOURING:			
Galv. Steel Wire (0·104 in.)	52	—	51½
Mild Steel Tape (0·014 in.)	40½	+½	39½

10 June—Australia. Supply of equipment for centralised control of consumer loading and street lighting for Sydney County Council, Queen Victoria Building, 457-79 George St, Sydney. Tender 1783. B.o.T. (Ref: ESB 6056/54).*

13 June—New Zealand. State Hydro-Electric Dept.'s Contract 256 invites tenders for supply of water turbine driven 312·5 kVA generating sets for Atiamuri power station. Copy of specif. at N.Z. Govt. Office in London.

22 June—New Zealand. State Hydro-Electric Dept., Wellington, are inviting tenders (No. 255) for manufacture and supply of ten single-phase, double wound transformer units, each 7,778 kVA, 11/127 kV, 50 c/s, outdoor type, oil immersed. Deposit £100. B.o.T. (Ref: ESB 5578/54).*

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Diplomat. 725,241. Class G. Dictating, sound recording and reproducing apparatus, etc. Thermionic Products Ltd., Shore Rd, Hythe, Southampton.

Durastop. 725,179. Class 17. Jointing material. Duratube and Wire Ltd., 37 Thursloes St, S.W.7.

Quickfit. 726,275, and **Q** in design B726,277. Class 21. Glass tubing and piping. Quickit and Quartz Ltd., 1 Albemarle St, W.1.

Armend. 724,244. **Alumend.** 724,245. **Minac.** 724,255. Class 9. Electrodes for welding. Rockweld Ltd., Commerce Way, Croydon.

Gazette Announcements

COMPANIES ACTS

Edgworth Electrics Ltd. Meeting of creditors and contributories to be held at offices of Latham and Co., Walter Hse, 418-22 Strand, W.C.2, on 20 Apr. at 12 noon, to receive liquidators.

Fluorescent Industrial Installations Ltd. Meetings of members and creditors taking place at Broadmead Hse, 21 Panton St, Haymarket, S.W.1, today (Thurs.) at 9.45 a.m. and 10 a.m. resp.

Harry George (Surbiton) Ltd. A. W. Hunter of Latham and Co., Walter Hse, 418-22 Strand, W.C.2, has been appointed liquidator.

Pluscold Installations Ltd. Resolution for winding-up passed at meeting on 2 Mar.

Selways Neon Lighting of Wales Ltd. Resolution for voluntary winding-up passed at meeting on 8 Mar. G. G. Thomas, C.A., 7-10 Oxford Buildings, Lr. Union St, Swansea, has been appointed liquidator.

BANKRUPTCY ACTS

Public Examination

Chester. William J. Standing, electrician trading at 7 Brook St, Chester. Public examination at The Castle, Chester, on 13 May at 10.15 a.m. First meeting was on 23 Mar.

Intended Dividends

Brentford. Basil F. Robbings, trading as Electric House at 1388 Greenford Rd, Greenford Green, Middlx, and as Radio and Electric House at 81b Northolt Rd, S. Harrow. Last day for receiving proofs, 31 Mar. Trustee is W. J. Wallis-Hill, Official Receiver, 58-61 York Terr, Regent's Park, N.W.1.

London. Alfred J. Digby, electrical contractor trading at 238 Walworth Rd, S.E.17; at 22f Doughty Mews, W.C.1; and at 8 Doughty Mews, W.C.1. Last day for receiving proofs, 6 Apr. Trustee is W. F. Cresswell, Official Receiver, Bankruptcy Buildings, Carey St, W.C.2.

Dividends

York. Edwin Vasey, electrician, of 21 Bridge Rd, Bishopthorpe, York. First and final dividends of 2s. 2d. in £ payable at Official Receiver's offices, 29 East Par, Leeds, on 31 Mar.

Release of Trustees

Kendal. Stephen Edmondson, electrical dealer and contractor trading as E and B Radio at Main St, Milnthorpe. Trustee was L. H. Shipton, certified accountant, 31 Lloyd St. Manchester.

Rochdale. Jack Hilbert, radio and electrical engineer, of 17 Manchester Rd, Haslinden, Rossendale. Trustee was A. T. Eaves, chartered accountant, 47 Mosley St, Manchester.

Contracts Placed

Newcastle-on-Tyne T.C. Electrical installations in houses at Chesterton and Clayton, Speed Electric Service, £2,820.

Stoke-on-Trent T.C. Emergency lighting system in town hall, Midlands Electricity Board, £6,543.

Wandsworth B.C. Supply of equipment for street lighting scheme; lanterns and gear, Erecon Ltd., £9,860; columns, N. Midlands Engineering Co., Ltd., £9,904; and 490 sodium lamps, Philips Electrical Ltd., £1,901.

BUSINESS PROSPECTS

Home

Ashford (Kent). Negotiations going ahead for erection of factory in Godinton Rd. for Smith's Potato Crisps (1929) Ltd.

Barmouth (Merioneth) U.D.C. Plans approved for four blocks of flats as part of sea front development.

Battle (Sus) R.D.C. Erection of 18 houses and 12 flats at Heathfield Gdns, Robertsbridge. Council's Architect, A. H. Neave, 38 Mount St.

Bradford. Plans approved for infants' school at Shirley Manor, Wyke.

Burton-on-Trent T.C. Construction of 100 houses on Edge Hill estate. Borough Surveyor, Town Hall.

Carlton (Notts) U.D.C. Erection of 28 houses in Chatsworth Ave. R. A. Allen, dep. engineer and surveyor, Council Hse, Burton Rd.

Cheltenham. Plans in hand for alterations to factory in St. Paul's La for Gloster Engineering and Pattern Co. L. W. Barnard and Partners, 13 Imperial Sq, are architects for factory in Tewkesbury Rd for A. Miles Ltd.

Cumberland. R.C. secondary modern school costing £100,000 to be built at Cleator Moor.

Dagenham. Donaldson and Sons, 17 Dalston Lane, E.8, are architects for factory proposed by Bendas and Bendas Ltd.

Darlington. Tenders to be obtained for extensive alterations and additions to main Post Office. Work to start in May.

Dartford (Kent) R.D.C. Plans approved for 20 houses in Lower Rd, Hextable, and 32 dwellings in St. John's Rd, Stone.

Daventry T.C. Layout plans approved for estate adjoining proposed British Timken Ltd. factory. Estate comprises 540 houses, 250 flats, 40 old people's dwellings and a shopping centre.

Dewsbury T.C. Negotiations in hand for erection of 150 dwellings on Overthorpe Rd site.

Edinburgh. Dean of Guild Court approved for erection of 65 houses in Colinton Mains Dve, 74 in Seafield Ave, and 38 in Pirnie Pl. Plans approved also for 450 houses at Oxgangs, Colinton Mains, Fillyside and Redside.

Farnworth (Lancs) T.C. Erection of 45 flats in Albert Rd. Borough Engineer and Surveyor, Town Hall.

Grantham (Lincs.). Grantham Precast Co., Ltd., of Alma Park, propose to build factory at Gonerby Hill.

Harrogate. H. Webster, 6 Vernon St, Leeds, is architect for factory in Hookstone Ave for Robert Hirst and Co., Ltd., Hammerton St, Bradford.

Hastings T.C. K. F. Wray, 43 Gildredge Rd, Eastbourne, is architect for block of 80 flats in Woodland Vale Rd.

Haywards Heath. Hospital for psychiatric cases to be built near Hurstwood Park Hospital. Estimated cost £98,000.

London. Following schools to be included in final programme for conversion to electric lighting: Falconbrook (Battersea), Hitherfield (Wandsworth), Royal Hill (Greenwich), Peckham Park and Watling. Also Battersea Men's Inst. Total estimated cost is £19,500.

Luton T.C. Final plans approved for William Austin primary school and for secondary technical school for boys.

Maidenhead T.C. Erection of 30 houses on Larchfield/Curls Lane estate. Borough Engineer and Surveyor, C. T. Read, 14 Cranford Rise.

Oldbury T.C. Erection of 89 houses (in contracts of 45, 24 and 20) on Brandhall estate. Borough Engineer, Municipal Bank Chambers, Birmingham St.

Reading T.C. Electrical consultant to be appointed for proposed extension of Parkhurst Old Peoples House.

Rochester T.C. Layout plans approved for erection of 344 houses on Temple Farm site.

Sandbach (Ches) U.D.C. Construction of 20 flats and 14 houses on site 5. H. J. Rees, engineer and surveyor, Council Offices, Crewe Rd.

Shotley Bridge (Dur.), A. Bolton and Co., colliery engineers, are seeking site for erection of factory.

Sunderland R.D.C. It is proposed to build 94 houses at Ryhope, 62 at Tunstall, 16 at Silksworth, 36 at Ford, 36 at Hylton, six at Harrington and four at Offerton.

Tralee (Eire) U.D.C. Erection of 92 houses on Cloonmore site, Quill St. F. O'Keefe, acting town clerk, Council Office, Thomas Ashe Memorial Hall.

Twickenham T.C. Approval given to installation of flashing beacons at estimated cost of £1,100.

Wakefield T.C. Erection of 40 flats in 10 blocks on Eastmoor estate. City Engineer (Room 33), Town Hall.

Whitby U.D.C. Plans prepared for 96 houses on White Leys estate.

Overseas

Canada. Representation of U.K. manufacturers of restaurant equipment sought by Domino Refrigeration and Appliances Ltd., of 500 Davie St, Vancouver 2. Items include electric meat saws, slicers and grinders, etc.

U.S.A. N. Wagman and Co. Inc., (Technical Instrument Div.), 238-40 Chestnut St, Philadelphia 6, wish to contact U.K. manufacturers of laboratory equipment.

MEETINGS TO NOTE

THURSDAY, 25 MAR.

I.E.E. (London).—"Kemano Hydro-Electric Development and Kitimat Aluminium-Reduction Works," F. L. Lawton. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Mersey and N. Wales).—Faraday lecture "Electro-Heat and Prosperity," O. W. Humphreys. Philharmonic Hall, Liverpool, 6.45 p.m.

E.P.E.A. (Merseyside).—"Economy in Choice of Switchgear," L. J. Bamber. Elect. Showrooms, Whitechapel, Liverpool, 7 p.m.

FRIDAY, 26 MAR.

I.E.E. (N. Eastern).—Annual dinner and dance at Old Assembly Rooms, 7 p.m.

I.E.E. (N. Midland).—Annual dinner and dance at Grand Hotel, Harrogate, 7 p.m.

I.E.S. (Bath and Bristol).—"Hospital Lighting," D. J. Reed. Elect. Offices, Colston Ave, Bristol, 6.15 p.m.

MANCHESTER ASSOC. OF ENGRS.—Annual meeting. "Engineering Aspects of Glass," Dr R. E. Bastick. Engineers' Club, Albert Sq, 6.45 p.m.

INCORP. PLANT ENGINEERS. (Birmingham).—Annual meeting. "Industrial Electrical Maintenance," D. Parkes. Imperial Hotel, 7.30 p.m.

MONDAY, 29 MAR.

I.E.E. (S. Midland).—"Development and Application of Nuclear Reactors," R. V. Moore. James Watt Memorial Inst., Gt. Charles St, Birmingham, 6 p.m.

I.E.E. (London Students).—"Mechanism of Electric Spark and Applications," C. Grey Morgan. Savoy Place, W.C.2, 6.30 p.m.

INC. PLANT ENGINEERS (West and East Yorks).—"High Frequency Heat Treatment," K. J. Irvine. Leeds University, 7.30 p.m.

I.E.E. (N. Western).—"Kemano Hydro-Electric Development and Associated Kitimat Aluminium-Reduction Works," F. L. Lawton. Engineers Club, Albert Sq, Manchester, 6.15 p.m.

TUESDAY, 30 MAR.

I.E.E. (E. Midland).—"Problems of a Plant Engineer in Nuclear Chemical Division," W. E. Harris. Loughborough College, 6.30 p.m.

I.E.E. (E. Midland).—"Earthing," P. W. Cave. University Arms Hotel, Cambridge, 7 p.m.

I.E.E. (N. Midland).—"Design Features of Certain British Power Stations," S. D. Whetman and A. E. Powell. Royal Station Hotel, York, 7 p.m.

I.E.E. (N.W. Measurements).—"Measurement of Winding Resistance of 132 kV Power Transformer in Service," K. J. R. Wilkinson and J. D. Harmer; "Automatic Plotter for Magnetic Hysteresis Loops," H. McG. Ross. Engs.' Club, Albert Sq, Manchester, 6.15 p.m.

I.E.E. (London Students).—"Servo Mechanisms," Capt. R. A. Middleton. Drill Hall, London Rd, Chelmsford, 7 p.m.

WEDNESDAY, 31 MAR.

I.E.E. (London Radio and Measurements).—Joint dinner dance at Cafe Royal, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (London). "Radio Astronomy," R. Hanbury Brown. School of Hygiene, Keppel St, W.C.1, 6.30 p.m.

THURSDAY, 1 APR.

I.E.E. (London).—"Possibilities of Cross-Channel Power Link," D. P. Sayers, M. E. Laborde and F. J. Lane. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Midland).—"Voltage Transformers and Current Transformers associated with Switchgear," W. Gray and A. Wright. Yorks Board, Ferensway, Hull, 7.15 p.m.

I.E.S. (Glasgow).—Discussion on "The Lighting Engineer." 39 Elmbank Cresc., 6.30 p.m.

I.E.S. (Glos. and Cheltenham).—"Effect of Light in Growth and Development of Plants," Miss D. Vince. G.E.C. Ltd., 2 St. Aldate St, Gloucester, 6.30 p.m.

I.E.S. (Nottingham).—"Lighting at Home and Abroad," A. D. Charters. Elect. Offices, Smithy Row, 6 p.m.

BRIT. INSTN. OF RADIO ENGINEERS (Merseyside).—"Logic, Algebra and Relays," Prof E. Williams. Elect. Offices, Whitechapel, Liverpool, 7 p.m.

BRIT. INSTN. OF RADIO ENGINEERS (N. Western).—Technical Films at College of Technology, Sackville St, Manchester, 7 p.m.

BRIT. INSTN. OF RADIO ENGINEERS (Scottish).—Short papers by members. 39 Elmbank Cresc., Glasgow, 7 p.m.

INCORP. PLANTS ENGRS. (Peterborough).—"Modern Engineer in Modern World," A. L. Berridge. Gas Offices, Church St, 7.30 p.m.

FRIDAY, 2 APR.

I.E.E. (N. Eastern).—Informal meeting at Liberal Club, 7 p.m.

I.E.E. (Sheffield).—Annual dinner-dance at Royal Victoria Station Hotel, 7.30 p.m.

I.E.S. (Birmingham).—"Television Studio Lighting," D. C. Lightbody. Regent Hse, St. Phillip's Place, Colmore Row, 6 p.m.

I.E.E. (London Students).—Spring dance at Victoria Halls, Bloomsbury Sq, W.C.1, 7.30 p.m.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

Automatic Electric Co., Ltd. Manufacturers of and dealers in automatic and other telephones, telegraphs, wires, cables, etc. Nom. cap.: £100. Dirs.: not named. Subs.: R. G. MacKenzie and G. D. Christie.

Baird and Davies Co., Ltd., 1 Stanley St, Holyhead. Construct, maintain and deal in wireless, television, electrical and radio apparatus, etc. Nom. cap.: £3,000. Dirs.: J. Baird and E. M. Davies.

Bell Instruments Ltd., 15 Barton St, Manchester 3. Manufacturers of instruments for the photographic and electrical industries, etc. Nom. cap.: £1,000. Dirs.: F. S. Boucher and J. A. Bell.

John Brown Land Boilers Ltd., 8 The Sanctuary, Westminster, S.W.1. To acquire part or parts of the business of John Brown and Co., Ltd., mechanical, electrical and general engineers, manufacturers of and dealers in stationary or locomotive boilers, steam and electric generating plant, etc. Nom. cap.: £100. Dirs.: Sir Stanley W. Rawson, Rt. Hon. Baron Aberconway, Sir James M. McNeill, E. Mensforth, J. W. Beck, Thomas Mensforth and W. V. Wright.

Burford Electric Co., Ltd., 14 St. Martins Hse, 29 Ludgate Hill, E.C.4. Manufacturers of and dealers in electrical apparatus and equipment, etc. Nom. cap.: £2,500. Dirs.: Marcelle C. Balivet and H. J. Golding.

Crin-o-Lyte Ltd., 11 Balham Grove, Balham, S.W.12. To take over business of Crin-o-Lyte (Stanley Clifford Baker) at Balham, S.W.12, manufacturers of and dealers in electrical fittings and accessories, leather goods, household furniture, stationery, fancy goods, etc. Nom. cap.: £100. Dirs.: A. S. Rosgreen and S. C. Baker.

TRADE NOTES

Changes of Address. As from today, 25 Mar., the London office of Morphy-Richards Ltd., is transferred to 6 Conduit St, W.1. Telephone: Mayfair 9656.

The move of Panelec (Great Britain) Ltd., to 27 Hatchlands Rd, Redhill, Surrey, is with effect from 20 Apr. The telephone number remains Redhill 3461.

Mono Pumps Ltd., have moved to larger premises at Mono House, 1 Sekforde St, London, E.C.1. Clerkenwell 8911.

As from 1 Apr., H. Cassirer Ltd. are moving to larger works at White Hart Yard, Guildford St, Chertsey, Surrey. Telephone: Chertsey 2048.

Elements for Australia. The Australian Department of Trade and Customs has now removed enclosed type heating elements for electric stoves, other than bakery ovens and elements for use as original equipment for imported stoves, from entry under By-Law tariff item 449 (A) (1). These elements now carry a British preferential duty of 22½% ad valorem.

Expansion. The Newcastle-on-Tyne sales office of Brook Motors Ltd. has moved to larger premises at 35 Pink Lane. The telephone number remains Newcastle 26763. The company also announce that they have taken over another factory at Aspley, Huddersfield, where a floor area of nearly 20,000 sq ft will be utilised for the manufacture of electrical stampings.

ENGLISH ELECTRIC COMPANY

Record Turnover—Export Problems

SIR GEORGE H. NELSON, F.C.G.I., M.I.MECH.E., M.I.E.E. (Chairman and Managing Director), presiding at the Annual Meeting held on March 17, said:

A further substantial increase both in production and turnover fully justifies the additional manufacturing facilities and further extensions in hand. This has been associated with a still further increase in the number of our employees. Orders in our books ensure the maintenance of our 1953 volume in 1954, but competition from overseas manufacturers has greatly increased and the volume of orders for export in 1953 has fallen (by comparison with 1952).

The net trading balance, before taxation, of £4,779,920 compared with £4,359,034, an increase of 9·6 per cent.

I still believe, in spite of greatly increased overseas competition, that the economic position of the country can continue to improve by the following means: (1) By maintaining our technical lead; (2) By increasing production; (3) By providing a lower cost; (4) By providing incentives for extra output.

Outstanding Events of 1953

You will have shared the pride of every employee of this Company in the continued achievement of the "Canberra" jet bomber, which, since I addressed you in March last year has set up six new world records, so raising its total to thirteen.

Steam Turbines: A number of large turbo-generating units were commissioned overseas during the year, including the third and fourth 66 MW sets at the J. Clark Keith Generating Station of the Hydro Electric Power Commission of Ontario, three more of the 10 30 MW sets at Vierfontein, South Africa, and the third 30 MW set for Pretoria.

Water Turbines: At present we have orders for 37 major units totalling over a million horsepower.

An order for two very large waterwheel generators was awarded to your Company by the United States Army Corps of Engineers, for the power station at McNary Dam, U.S.A. We have also secured in Canada an order for what we believe to be the most powerful water turbines in the world, namely four units of 175,000 b.h.p. for the Quebec Hydro Commission's Bersimis power station. These turbines will be built in one of the factories of our associated company in Canada.

Traction: This year's traction production includes 25 streamlined passenger or freight 2,400 h.p. electric locomotives with rheostatic braking, for the Victoria Government Railway, Australia.

In the Diesel electric field 10 1,500 h.p. locomotives powered by the Company's 12 SVT engine have been shipped to the Queensland Government Railways.

In switchgear the outstanding event has been the commissioning at West Melton of a 275 kV 7,500 MVA airblast circuit breaker, which is connected in the British Electricity Authority's transmission line between West Melton and Staythorpe.

The report and accounts were adopted.

MARCONI'S WIRELESS TELEGRAPH

Sir George Nelson's Speech

THE 56th annual general meeting of Marconi's Wireless Telegraph Co., Ltd., was held on 17 Mar. in London.

Sir George H. Nelson, F.C.G.I., M.I.MECH.E., M.I.E.E., the chairman, in the course of his speech, said: The demand for our airborne and ground communication equipment and navigational aids by leading airlines, aircraft manufacturers and airport companies at home and overseas remains at a high level. The progress made in advanced development in systems and methods of air communication should ensure substantial business in these fields for years to come.

Radio Communications: Your company is, as you know, one of the few—perhaps the only—commercial communications manufacturing organisation which devotes real effort to the study of radio propagation. The unique knowledge thus accumulated since we introduced radio communication to the world has done much to ensure the pre-eminence of our radio communication equipment.

Television

In television we can look back on this year with exceptional pride, for it was our television cameras and control equipment which were used exclusively by the B.B.C. for their superb televising of the momentous Coronation service in Westminster Abbey. Tens of millions of viewers will never forget those wonderful scenes taken and transmitted with such fidelity by our equipment. We also carried out at very short notice indeed the installation of a television transmitter in Ottawa to enable the people of Canada's capital to view the film of the Coronation on Coronation Day itself.

The year has also seen the inauguration of a television service for Italy for which your company was honoured with the largest single television export order ever given to one manufacturing company.

Our chief source of pride is the award of the order for vision and sound transmitters for the future B.B.C. London station at Crystal Palace. The B.B.C. are acknowledged masters of television techniques, and we are confident that the new station, which is due to open in 1956, will be an example to television engineers for years to come throughout the world.

Maritime

We are proud to have contributed a great deal of special equipment to the "Gothic" for her present Royal Tour, including the installation of a transmitter of unique power for a merchant vessel.

During the year we have completed the programme for equipping with radio beacons no less than 45 lightships and lighthouses in the U.K. home waters.

Your company is also responsible for the design, manufacture and supply of equipment to The Marconi International Marine Communication Company, the major supplier of communication and navigational aid equipment to the Merchant Navy.

The report was adopted.

Final inspection of a consignment of Henley DWARF Pillars at the Works. These pillars are fitted with angle type Sealing Boxes. Straight boxes are available as alternatives.

The jointers will be happy when they see these!

They will find there is ample space for jointing and it's simpler, too, in the HENLEY Dwarf Pillar. The shells are compact, with pleasing design, and provide ready access for jointing operations, all of which can be carried out from the front.

The small dimensions of the Dwarf range have made them extremely popular for a wide variety of situations, such as on housing estates or in industrial buildings.

Interested engineers are invited to write for Catalogue 22.

HENLEY **DWARF TYPE**

GROUP 22

DISTRIBUTION PILLARS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

Model E.900
CABINET TYPE ELECTRIC WASHBOILER
WITH WRINGER ATTACHED
Sell with or without Acme wringer
AVAILABLE IN CREAM OR WHITE ENAMEL
NO PURCHASE TAX

. . . The Electric Wash boiler with Wringer attached—sleek and smart, with a practical reason for every feature of modern design. It carries the usual BURCO tradition of the fine workmanship.

This model when fitted with a BURCO Agitator Lid Unit becomes a complete Washing Appliance.

Supported by bigger advertising than ever.

Burco

BURCO LTD · ROSE GROVE · BURNLEY · LANCS ·

The Aristocrats of Electric Washday Appliances

Also makers of the famous BURCO All-Electric Washing Machine

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

BOROUGH OF BROMLEY KENT
Group "A" Street Lighting Improvement Scheme Third Stage

TENDERS are invited for the improvement of the street lighting in Westmoreland Rd, Bromley Common, Hastings Rd and part of Tweedy Rd, comprising approximately 2¼ miles of sodium and approximately 270 yds of fluorescent lighting. The work includes dismantling the existing tungsten filament lamps, removing and re-erecting existing 25 ft tubular steel columns, erecting new tubular steel columns to be supplied, providing, fixing and wiring No. 7 fluorescent lanterns, No. 12 sodium lanterns and associated equipment.

Contractors wishing to tender should apply for the necessary documents to the Borough Engineer, at the address below, enclosing a deposit of £2. 2s. which will be refunded on receipt of a bona fide tender not subsequently withdrawn.

Tenders in a plain sealed envelope marked "Tender—Street Lighting" must be delivered to the undersigned not later than Monday, 12 Apr., 1954.

The Council does not bind itself to accept the lowest or any tender.

LIONEL KAYE,
Town Clerk.

Municipal Offices.
Bromley, Kent.
19 Mar., 1954. (H 277)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Shin/Caithness Transmission
33 kV Switchgear for Mybster Substation

TENDERS are invited for 33 kV switchgear and ancillary equipment for Mybster Substation.

Copies of the Tender Documents may be obtained from The Chief Electrical and Mechanical Engineer, 16 Rothesay Ter, Edinburgh, on receipt of a deposit of £2. 2s. (returnable).

The Board do not bind themselves to accept the lowest or any Tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Ter,
Edinburgh 3. (H 251)

CITY OF MANCHESTER EDUCATION COMMITTEE
Extension to the Municipal College of Technology Electrical Engineering Equipment

TENDERS are invited for supplying the following Electrical Equipment:

1. Impulse generator and charging unit with control facilities; surge potentiometer; loading capacitor. Rating approximately 1·4 MV, 20 kW-sec. (Reference 332.)

2. Power frequency transformer with cascade winding and control facilities. Rating approximately 330 kV. Good waveform essential. (Reference 334.)

3. 500 mm. or 750 mm. Vertical portable sphere gap with remote control. (Reference 337.)

continued in next column

continued from previous column

4. 60 Portable indicating instruments. (Reference 1068.)

More detailed information regarding the above will be furnished on application to the Registrar, College of Technology, Manchester 1.

Tenders (in duplicate), enclosed in sealed envelopes and endorsed "College of Technology, Electrical Engineering Equipment," must be delivered to The Chairman, College of Technology Sub-Committee, Education Offices, Deansgate, Manchester 3, to reach him not later than 10 a.m. on Saturday, 10 Apr., 1954.

The Committee does not bind itself to accept the lowest or any tender. (H 230)

GOVERNMENT OF KUWAIT

THE GOVERNMENT OF KUWAIT invite tenders for the supply F.O.B. port country of origin of 415 V Distribution Fusegear for Phase II of the 11 kV Power Distribution System in Kuwait. Specifications will be available on 4 Apr., 1954, for submission of tenders by 16 May, 1954. Specifications must be obtained from the President of the Department of Electricity, Government of Kuwait, Kuwait, Persian Gulf, and will only be available to accredited Kuwaiti Agents. All further copies of the specifications will be issued by the Consulting Engineers in London, at the request of the Government of Kuwait. Notice of the foregoing will be posted on the notice board of the Department of Electricity, Kuwait on 29 Mar., 1954.

EWBANK AND PARTNERS LTD.,
Engineering Consultants.

10/11 Grosvenor Place,
London, S.W.1. (H 294)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following post:

JUNIOR ENGINEER
LITTLE BARFORD GENERATING STATION

Salary: Class G, Grade 16, £402—Grade 14, £491 per annum.

Commencing salary depending on qualifications and experience.

The duties of the successful applicant will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications stating age, qualifications and experience, should be sent to the Controller, British Electricity Authority, Eastern Division, Northmet Hse, Southgate, N.14, by 3 Apr., 1954. W. N. C. CLINCH,
Controller.
(H 255)

THE SOUTH WALES ELECTRICITY BOARD

REQUIRED COMMERCIAL ASSISTANT, District 104 (Aberayron) in the Western Sub-Area.

Applicants must have had experience in the application of electricity to domestic and commercial premises and all general purposes.

Salary—Class C, Grade 9 (£532/£541/£551) of N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, to be addressed to the Secretary to arrive by 3 Apr., 1954.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (H 281)

SOUTH EASTERN ELECTRICITY BOARD
Junior Engineer—Hastings District

COMMENCING salary £433 p.a. under N.J.B. Class E.14. Applicants should hold the Higher National Certificate or its equivalent in Electrical Engineering. General experience on overhead and underground distribution networks up to 11 kV would be an advantage.

Applications to reach G. C. B. Everard, District Manager, SEEBoard, Hastings District, 12/13 York Buildings, Hastings, not later than 7 Apr., 1954.

A. L. BURNELL,
Secretary.
(H 280)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

APPLICATIONS are invited for the following positions in the Generation (Operation) Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A" of the Agreement:

(a) BOILER HOUSE SHIFT CHARGE ENGINEER at Nechells "A" Power Station, Grade F9, commencing at £607 per annum. (Vacancy No. 631MD).

(b) ASSISTANT ENGINEER (Technical Records) at Hams Hall "A" Power Station, Grade J12, commencing at £596 per annum. (Vacancy No. 632MD).

Applicants for these positions should have received a sound technical training and power station practical experience, in particular for (a) in the operation and maintenance of steam generating plant and main switchgear, and for (b) a knowledge of statistics and the keeping of technical records is desirable. Appropriate qualifications an advantage.

Apply on form AE6, quoting the vacancy number, to the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 10 Apr., 1954. (H 279)

CITY ARCHITECT'S DEPARTMENT, MANCHESTER

APPLICATIONS are invited from persons having suitable qualifications and/or experience for the appointment of Electrical ENGINEERING ASSISTANT experienced in the design of electrical installations in buildings, salary Grade A.P.T. III, £550/£595 per annum.

Further particulars and form of application may be obtained from the City Architect, Town Hall, Manchester 2, the completed form to be returned to the same address by 8 Apr., 1954. Canvassing is prohibited. (H 269)

BRITISH ELECTRICITY AUTHORITY
South Wales Division

APPLICATIONS invited for superannuable N.J.B. appointment of SHIFT CHARGE ENGINEER at Uskmouth Power Station, Nr. Newport. Salary K.7 (£869/£907 per annum).

Applicants should preferably have obtained H.N.C. and served a regular apprenticeship. Previous experience of operation in a modern power station essential.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, should be returned by 5 Apr., 1954. (H 270)

SOUTH WESTERN ELECTRICITY BOARD
2nd Assistant District Engineer (Overhead Construction), Exeter

CANDIDATES should have experience of construction and maintenance of overhead line works, and supervision of line survey. Possession of appropriate technical qualifications and driving license desirable. Salary: N.J.B. Class E, Grade 7 (£649/£681 per annum). Application Forms from District Manager, 46 North St, Exeter, to be returned within 10 days. (H 291)

YORKSHIRE ELECTRICITY BOARD
Area Board Headquarters

QUANTITY SURVEYOR ASSISTANT

CANDIDATES should be experienced in working-up, site measuring, valuations for interim certificates and the preparation and settlement of final accounts. The successful candidate will work under a Chartered Quantity Surveyor.

Preference will be given to candidates who hold an educational certificate acceptable by the Royal Institution of Chartered Surveyors for entering for the professional examinations.

Salary: N.J.B. Grade 9, Schedule C, Class AX/DX, £390/£572 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 8 Apr., 1954.

NO. 7 GRIMSBY SUB-AREA
WORKSHOP SUPERINTENDENT
APPLIANCE MAINTENANCE

Applicants should have had a sound technical education and extensive experience in the supervision of Workshops, handling the complete renovation of electrical domestic appliances including the keeping of records and statistics in connection therewith. The successful applicant will also be required to supervise the servicing of apparatus on consumer's premises.

Salary: N.J.B. Class G, Grade 10, £608/£630 per annum.

NOTE: It is anticipated that on 1 Apr., 1954, the Sub-Area will be reclassified and the salary scale will then be £641/£667.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 8 Apr., 1954.

SCUNTHORPE DISTRICT

JOINTER or JOINTER (E.H.T.) required in the above District. N.J.I.C. rate of pay and conditions of service (Jointer, 3s. 6d.; Jointer—E.H.T., 3s. 8d. per hour) for a 44-hour, 5-day week. A house may be available in Scunthorpe. Applications giving particulars of age and experience should be sent to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, to arrive not later than 8 Apr., 1954. (H 253)

COUNTY BOROUGH OF BLACKPOOL
Appointment of Senior Technical Assistant

APPLICATIONS are invited for the superannuable appointment, in the Electrical Services Department, of a Senior Technical Assistant (A.P.T. VII) (£735 x £25 to £810). The post is subject to special conditions as to office hours, particulars of which may be had on application.

Candidates must have had a sound technical training with experience in electricity distribution, street lighting and/or lighting engineering and possess administrative ability.

Applications, giving particulars of age, present position, full details of qualifications and experience, including names and addresses of two referees, to be forwarded to the Illuminations and Public Street Lighting Officer, Electrical Services Department, Rigby Rd East, Blackpool, to reach him not later than 10 Apr., 1954.

Canvassing, or the submission of the names of members of the Blackpool Council as referees, will disqualify candidates.

TREVOR T. JONES,
Town Clerk.
(H 236)

BRITISH ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts, conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. of I.MECH.E. for posts (a) and Corporate Membership for posts (b), an advantage.

(a) JUNIOR ENGINEERS (CONTROL)
BANKSIDE GENERATING STATION
54/204

Duties include assisting in main Control Room, with opportunity for gaining general knowledge of Power Station. Shift duties. Salary, Class H, Grade 15/3, £473 p.a.

(a) JUNIOR ENGINEERS
BLACKWALL POINT GENERATING STATION
54/205

General duties in Generating Station. Class F, Grade 14, £491 p.a.

(b) DEPUTY BOILER HOUSE SUPERINTENDENT
DEPTFORD EAST GENERATING STATION

Sound mechanical training with wide experience in the efficient operation and maintenance of Boiler House and auxiliary plant. Salary Class J. Grade 7, £857. 17s. p.a.

Application, quoting vacancy number, may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (H 278)

BRITISH ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following positions:

GENERAL ASSISTANT ENGINEERS
TRANSMISSION DEPARTMENT

Applicants should have had a works apprenticeship on switchgear or transformers or have had training and experience of H.V. and L.V. supply systems. Experience on either the erection of steel tower overhead lines or laying of H.V. underground cables will be an advantage, as there are vacancies for the supervision of 275 kV overhead line and 66 kV cable construction work.

Opportunity will be given later for successful candidates to gain experience in either the overhead line, cable or substation sections, or on maintenance work in the Transmission Sections.

Applicants should possess a Higher National Certificate or its equivalent, and possession of qualifications leading to corporate membership of an appropriate professional institution will be considered an advantage.

Persons who applied in January need not re-apply.

Salary: N.J.B. AX/CX Grade 8, £501/£675.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, must be returned by 7 Apr., 1954. (H 273)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

ASSISTANT ENGINEER
HEREFORD DISTRICT
SHROPSHIRE AND HEREFORDSHIRE SUB-AREA

Applicants will be responsible to the District Manager for the efficient administration and operation of the Ledbury Branch, including Commercial activities, Supervision of Contracting Department, Load Development, Preparation of H.V. and L.V. Mains Schemes, Maintenance of Supplies and carrying out of Switching Operations. Technical qualifications desirable. Salary £699/£725 per annum (N.J.B. Grade E.6). Apply, in writing, within 14 days, stating age, experience, present position and salary to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

JUNIOR ENGINEER
COMMERCIAL DEPARTMENT
CENTRAL GLOUCESTERSHIRE SUB-AREA

Previous experience in commercial or distribution activities an advantage. Technical qualifications desirable. Salary £424 per annum (N.J.B. Grade H.16). Apply, in writ-

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ing, within 14 days, stating age, experience, present salary and position, to Mr D. Holt, Sub-Area Manager, Midlands Electricity Board, 126 London Rd, Gloucester.

A. STEPHENS,
Secretary.
(H 274)

EASTERN ELECTRICITY BOARD
Suffolk Sub-Area

DEMONSTRATOR—
BURY ST. EDMUNDS DISTRICT

CANDIDATES should have had Domestic Science training including Electrical Housecraft, should preferably hold the E.A.W. Certificate and be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an Electricity Service Centre is desirable.

Salary will be in accordance with Grade 1 (£400 by £20—£480 by £10—£490) of the National Joint Council Salary Agreement, although progress beyond £400 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the Grade. Future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience with details of present appointment and salary should be submitted to the District Manager, Bury St. Edmunds, Eastern Electricity Board, 4 Cornhill, Bury St. Edmunds, Suffolk, within 14 days of the appearance of this advertisement. (H 276)

BRITISH ELECTRICITY AUTHORITY
South East Scotland Division

ASSISTANT SECTION ENGINEER (Transmission) required for Edinburgh (Currie) Section.

Applicants must have had at least two years experience in maintenance of 132 kV transmission lines, cables and substation equipment, and possess qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

Salary £584/£745 (N.J.B. Class AX/BX/6) Pension Scheme.

Apply in writing by 3 Apr., 1954, stating age, qualifications and experience to Divisional Controller, British Electricity House, Portobello, Midlothian. (H 271)

SOUTH WESTERN ELECTRICITY BOARD
Plymouth District

SENIOR SERVICE CENTRE ASSISTANT required. Applicants should possess extensive experience in salesmanship and display methods and have a wide knowledge of domestic and small industrial and commercial apparatus. Possession of E.D.A. Certificate in Salesmanship an advantage.

Salary: N.J.C. Grade 3, £545 by £20 to £605 per annum.

Applications on forms obtainable from District Manager, South Western Electricity Board, Armada St, Plymouth, should be returned to him not later than 7 Apr., 1954. (H 284)

SOUTHERN ELECTRICITY BOARD
Assistant Engineer (Central)

SOUTHAMPTON District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.B. Class F, Grade 12, Column 1 (£507 per annum). N.J.B. Conditions of Service.

Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and distribution equipment. The appointments will involve stand-by duties.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him in envelopes suitably endorsed not later than 9 Apr., 1954. (H 292)

BRITISH ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ENGINEERING DRAUGHTSMEN (CIVIL)
CONSTRUCTION DEPARTMENT
Vacancy No. 1/54

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with official and administrative buildings.

The salary will be in accordance with Grade 5 (£567/£671 per annum) or Grade 6 (£433/£567 per annum) of Schedule D of the National Joint Board Agreement.

ENGINEERING DRAUGHTSMEN (MECHANICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 2/54

Senior Draughtsmen are required in the Mechanical Section of the Construction Department at North Wilford Power Station. Candidates should have experience in one or more of the following:

(i) Design and layout of Power Station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.
(ii) H.P. and L.P. steam and feed pipework. Condensing plant and feed heating systems.
(iii) Conveyor plant, coal handling systems and material handling of station auxiliary equipment.

The salary will be in accordance with the National Joint Board Agreement, Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 3/54

Candidates should have experience in the preparation of layouts and diagrams for the installation of E.H.T. and L.T. Switchgear, transformers, E.H.T. and L.T. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with the National Joint Board Agreement Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience.

ASSISTANTS TO THE DIVISIONAL CHIEF CHEMIST
Vacancy No. 37/54

Applications are invited for two positions as Assistants to the Divisional Chief Chemist.

Salaries and conditions will be in accordance with the National Joint Board Agreement, Schedule C, as under:

(A) Grade 5 — £649 — £790 — £858
(B) Grade 8 — £501 — £639 — £694

Candidates for post (A) should hold the B.SC. degree in Chemistry of equivalent qualification; candidates of a lower standard will be considered for post (B). Power Station experience is not essential but applicants should have had previous industrial experience on one or more of the following fields:

Air pollution; river pollution; fuel analysis; industrial water treatment; lubrication; inorganic analyses, metallurgy, or metallography, applied statistics; corrosion.

Post (A) is located in Nottingham and post (B) (temporarily) at Staythorpe, near Newark, Notts.

The closing date for receipt of applications is 5 Apr., 1954.

THIRD ASSISTANT ENGINEER (CIVIL)
NORTH WILFORD POWER STATION
Vacancy No. 39/54

Applicants should hold a degree in Civil Engineering, be Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel and other civil engineering works associated with the design and construction of Power Station.

Experience in the preparation of specifications, bills of quantities and estimates will be an advantage.

The salary for this appointment will be

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within Schedule C, Class AX/DX, Grade 5 (£649/£858 per annum) of the National Joint Board Agreement.

The closing date for receipt of applications is 12 Apr., 1954.

THIRD ASSISTANT ENGINEER (ELECTRICAL)
CONSTRUCTION DEPARTMENT, DIV. H.Q.
Vacancy No. 40/54

Applicants should be fully conversant with contract procedure and have had a fundamental training in electrical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of switchgear transformers, electrical auxiliaries, main and multicore cablework, and lighting and heating installations for large power stations.

Preference will be given to candidates who possess a Universlty degree or equivalent qualification in electrical engineering.

The salary for the appointment will be within Schedule C, Class AX/DX, Grade 5 (£649/£858 per annum) of the National Joint Board Agreement.

The closing date for receipt of applications is 12 Apr., 1954.

GENERAL ASSISTANT ENGINEER (CIVIL)
NORTHAMPTON POWER STATION
Vacancy No. 41/54

Preference will be given to candidates with a degree in Civil Engineering or equivalent qualifications.

The salary for this appointment will be in accordance with Schedule C, Class AX/DX, Grade 8 (£501/£694 per annum) of the National Joint Board Agreement.

The closing date for receipt of applications is 12 Apr., 1954.

SHIFT CONTROL ENGINEER
DERBY POWER STATION
Vacancy No. 38/54

Applicants should have had a sound training and practical experience in a modern Generating Station. The possession of a Higher National Certificate in Electrical Engineering, or its equivalent, would be advantageous.

The salary will be in accordance with Class F, Grade 10 (£577/£598 per annum) of the National Joint Board Schedule.

The closing date for receipt of applications is 12 Apr., 1954.

The above positions will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
(H 293)

BRITISH ELECTRICITY AUTHORITY
North Western Division

VACANCY No. 42/54 — SHIFT CHARGE ENGINEER, Westwood Generating Station, near Wigan. Sala y £729/£758 (G.7).

Vacancy No. 43/54 — JUNIOR ENGINEER (Telecommunications), Technical Department, Roosecote, nr. Barrow. Salary £390/£589 (AX/EX 9). ONC (Elec.) or C and G Certificate in Telephony desirable.

Apply, quoting Vacancy No., to Establishment Officer, British Electricity House, 825 Wilmslow Rd, Manchester 20, before 3 Apr. (H 245)

THE NORTH WESTERN ELECTRICITY BOARD
Appointment of Foreman (Overhead Line), Staylebridge District

APPLICANTS should be capable of supervising the erection and maintenance of all classes of overhead line work (including services) at voltages up to and including 33 kV.

Salary: £540 p.a. Schedule E, Grade 2, N.J.I.C. Conditions.

Applications to the Sub-Area Manager, No. 3 Sub-Area, The North Western, Electricity Board, Union St, Oldham, by 3 Apr., 1954. (H 254)

NORTH STAFFORDSHIRE TECHNICAL COLLEGE
(Stoke-on-Trent)
(Principal: H. W. Webb, O.B.E., D.Sc.)

APPLICATIONS are invited for the following appointments to commence on 1 Sept. next.

1. ASSISTANT LECTURER (Grade "A" in ENGINEERING. Applicants should be competent to teach Engineering Drawing, Mathematics and Science to elementary students. Ability to teach English or Workshop Practice or elementary Electrical Engineering would be an advantage.

2. ASSISTANT LECTURER (Grade "A") in ELECTRICAL ENGINEERING. Applicants should be competent to teach Electrical Engineering up to at least the Ordinary National Certificate standard. Some experience in electrical installation work is desirable.

Salary for both the above appointments according to the Burnham Technical Scale for Assistants Grade "A" (£415 x £18 to £670 per annum) with full additions for training, graduate qualification and experience. It is expected that the above scale will be increased by the new Burnham Award.

Applications giving details of the qualifications, training and experience should be sent to the Principal immediately.

H. DIBDEN,
Clerk to the Governors.
(H 252)

BRITISH ELECTRICITY AUTHORITY

RESEARCH Sub-Department, Headquarters, London, require:

(1) THIRD ASSISTANT ENGINEER. Candidates should have at least three years' industrial experience (other than instructional) and should preferably be Graduate Members of the I.E.E. or the I.Mech.E. The post demands a sound knowledge of the general principles underlying electricity supply techniques, rather than specialised skill. Applicants should be interested in engineering development, have some mathematical ability and be mentally adaptable. There is unlkely to be much scope for experimental research. Salary: N.J.B. Grade 4, £753/£981, including London Allowance.

(2) GENERAL ASSISTANT ENGINEERING, preferably with an Honours Degree in Engineering or Physics, to work on problems such as prevention of cable corrosion, and earthing arrangements for distributions systems. Duties may include taking part in field tests. Experience of underground cables or other aspects of distribution or transmission systems would be an advantage. Salary: N.J.B. Grade 5, £558/£769, including London Allowance.

Applications stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, British Electricity Authority, Winsley St, London, W.1, by 9 Apr., 1954. Quote reference ET/468. (H 268)

A VACANCY occurs in South-West England for a responsible SALES ENGINEER generally experienced in the application and selling of equipment associated with electrical supply and power distribution, metalclad switchgear all voltages up to 33 kV, complete ranges of distribution and power transformers and industrial motors. The post is an important one attached to Bristol Office and carries good commencing salary commensurate with experience and qualifications. Please apply with full details to the Chief Personnel Officer, THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough, Leics. (H 272)

APPLICATIONS are invited from SALES ENGINEERS experienced in the application and selling of Industrial Electric Motors and Generators both A.C. and D.C. up to 1,000 H.P./kW. Vacancies exist in Manchester, Leeds and Birmingham Areas carrying good commencing salary commensurate with experience and qualifications and with good future prospects. Please apply with full details to the Chief Personnel Officer, THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough, Leics. (H 275)

A BIRMINGHAM wholesaler, old established, E.W.F. and R.W.F., requires ELECTRICAL REPRESENTATIVE to call on large users and contractors. Pension and Life Assurance scheme. Car provided or allowance paid. Write stating salary required and past experience to—Box No. 3357, Electrical Times. (H 129)

A QUALIFIED Electrical Engineer or Technical Representative required by a leading firm of Manufacturers to call upon Architects and Consulting Engineers in the London Area. Full particulars, including age and experience to Box 7533, c/o CHARLES BARKER AND SONS LTD., 31 Budge Row, London, E.C.4. (H 267)

BRUCE PEEBLES AND CO., LTD., Edinburgh 5, have a vacancy for a competent inside Sales Engineer for preparation of transformer tenders for home and export markets. Qualifications Higher National Certificate in Electrical Engineering. State experience, age, and salary required to Sales Manager at the above address. (H 247)

BRUCE PEEBLES AND CO., LTD., Edinburgh 5, have a vacancy for a competent Transformer Outside Sales Engineer for Scotland. Qualifications Higher National Certificate in Electrical Engineering. State experience, age, and salary required to Sales Manager at the above address. (H 248)

CABLES SALESMEN. Excellent opportunities exist for young men who are prepared to work hard in return for good remuneration. A leading manufacturer of electric cables has vacancies for salesmen in South-West England, Yorkshire and Scotland, and invites applications for positions as senior representatives in these areas. Knowledge of rubber and plastic cables and the contracting trade essential. Write—Box No. 3407, Electrical Times, giving age, qualifications, experience and present salary. (H 256)

ELECTRICAL ENGINEER required for Electrical Department of Works in the North-East. Should have a sound practical training, drawing office experience, a knowledge of motor control gear resistor calculations, and preferably some experience of electrical heating for industrial applications. Apply giving full details of experience, technical qualifications, age, whether married or single, and salary required to—Box No. 3349, Electrical Times. (H 119)

ELECTRICAL ENGINEERS for Atlas Lighting Division, Thorn Electrical Industries Ltd., with sound theoretical knowledge and experience of (a) illuminating engineering and technical writing, and (b) production engineering and fluorescent lighting equipment tenders. Good salary. 5-day week. Pension Scheme. Apply in writing: Staff Manager, 105 Judd St, W.C.1. (H 283)

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OUTSIDE SERVICE REPRESENTATIVES required by Electricity Meter manufacturer, London. Knowledge and experience in calibration and handling of single and polyphase meters, P.P. meters and M.D.I. meters and equipment. Good general and technical education; specialised training given in company's products. Previous O.S. experience not essential—Write, giving full particulars, including present salary, to—Box No. 3389, Electrical Times. (H 193)

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Must be capable of taking charge of large contracts in Town and Country.
Must hold E.T.U. Ticket.
Write giving full particulars to:
RASHLEIGH PHIPPS & CO., LTD.
Electrical Engineers,
Esmond Court, Thackeray St.
Kensington, W.8. (H 123)

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PROGRESS in manufacturing methods and techniques in connection with heavy rotating electrical machines and Mercury Arc Rectifiers have led to several interesting vacancies in THE ENGLISH ELECTRIC CO., LTD., Stafford, for MANUFACTURING OR METHODS ENGINEERS and PRODUCT DEVELOPMENT ENGINEERS. Applications are invited from engineers working in either of these capacities and from those who have a sound background of practical experience in a manufacturing industry, at least O.N.C. and a desire to enter either of these important branches of engineering. Please write quoting ref. 1225A, to Dept. C.P.S., 336/7 Strand, W.C.2. (H 225)

SALES ENGINEERS, D.C. and A.C. motors and control gear, required London, Manchester and Birmingham areas, outside sales experience essential. Apply in writing only to Sales Director, VERITYS LTD., Brettenham House, Strand, London, W.C.2. (H 184)

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Details and form of application may be obtained on application to the County Architect, Springfield, Maidstone. (H 250)

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WELL-KNOWN firm specialising in electric space heating, 20 miles S.E. London, requires ELECTRICAL ENGINEER having sound practical training, drawing office experience, conversant with automatic control circuits. Knowledge of heating an advantage. Aged between 25/30. Superannuation scheme. Apply giving full details of experience, technical qualifications and salary required, to—Box 3413, Electrical Times. (H 266)

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RASHLEIGH PHIPPS & CO., LTD.
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(H 264)

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THE TELEGRAPH CONSTRUCTION AND MAINTENANCE CO., LTD., cable manufacturers, have the following male technical vacancies for work on the inspection and carrier frequency testing of Submarine Cables:

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YOUNG ENGINEERS with at least O.N.C. and practical manufacturing experience are required by THE ENGLISH ELECTRIC CO., LTD., Stafford, for estimating work on control gear related to rolling mill drives. Write quoting ref. 1199B, to Dept. C.P.S., 336/7 Strand, W.C.2. (H 204)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2.

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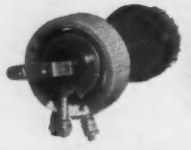

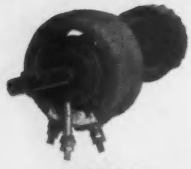

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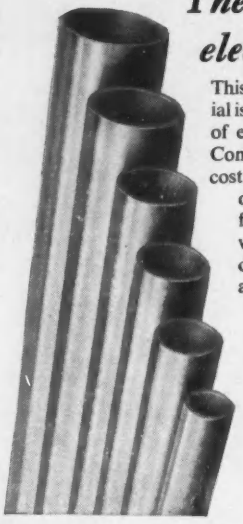

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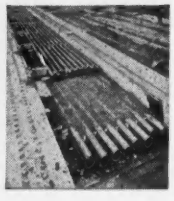

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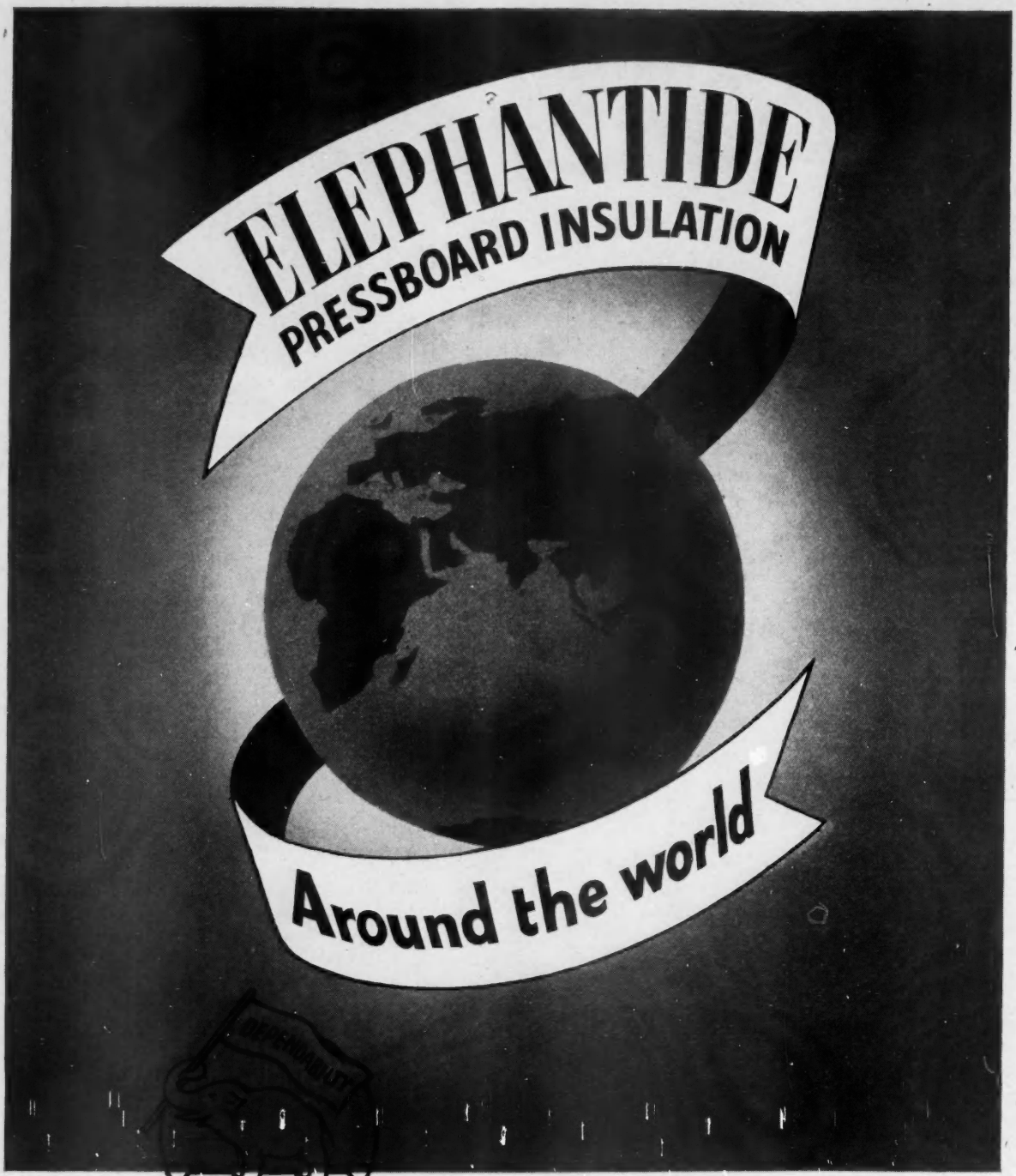

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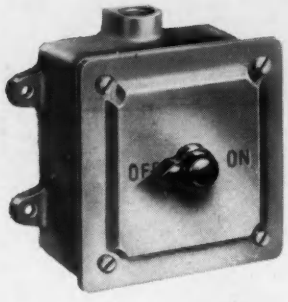

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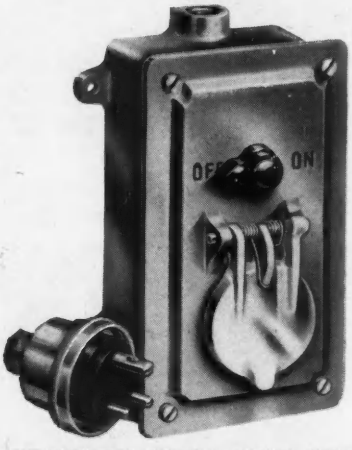

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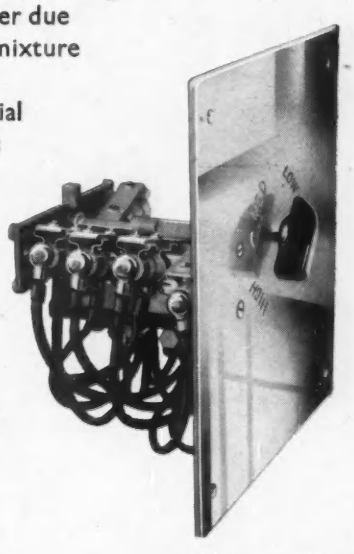

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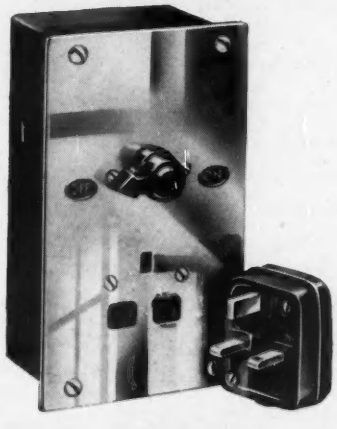

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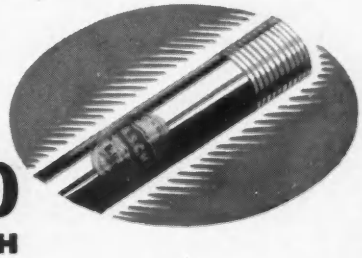

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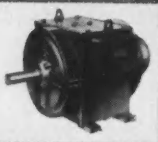
the	BRUSH		Square	Path
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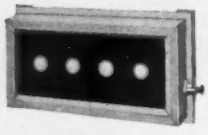

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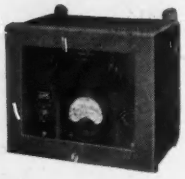

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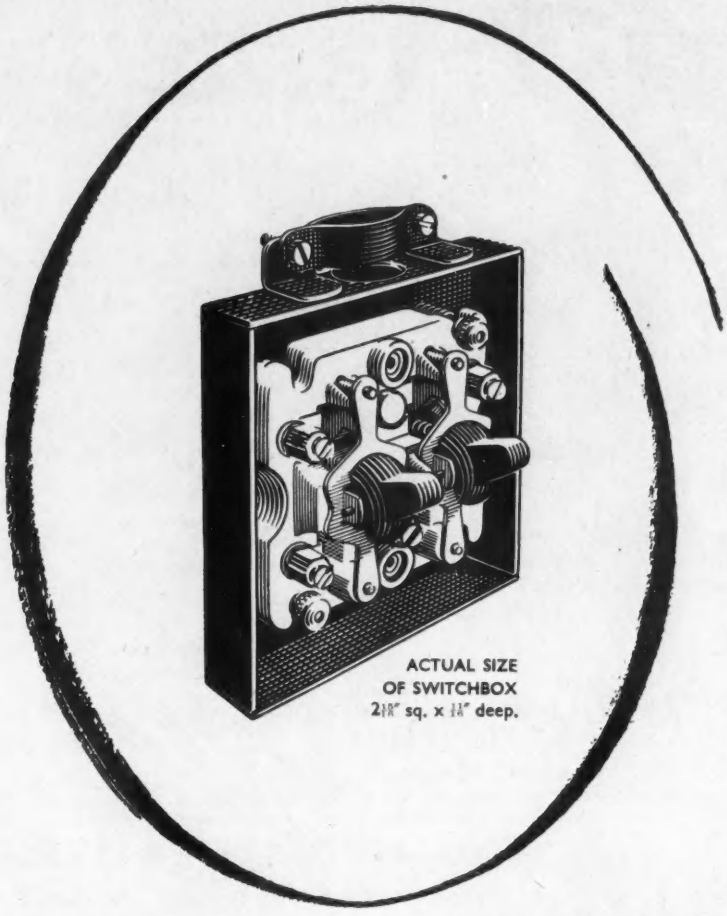

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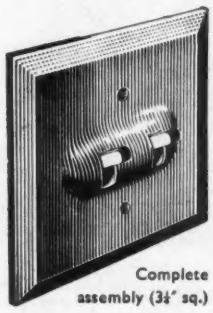

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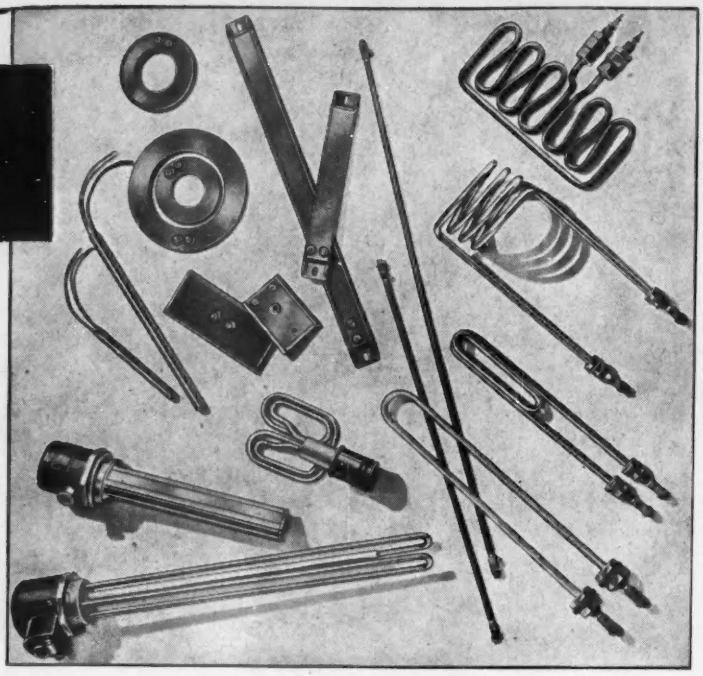

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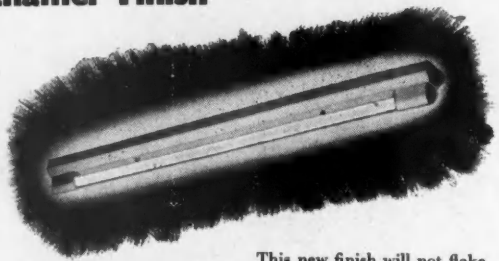

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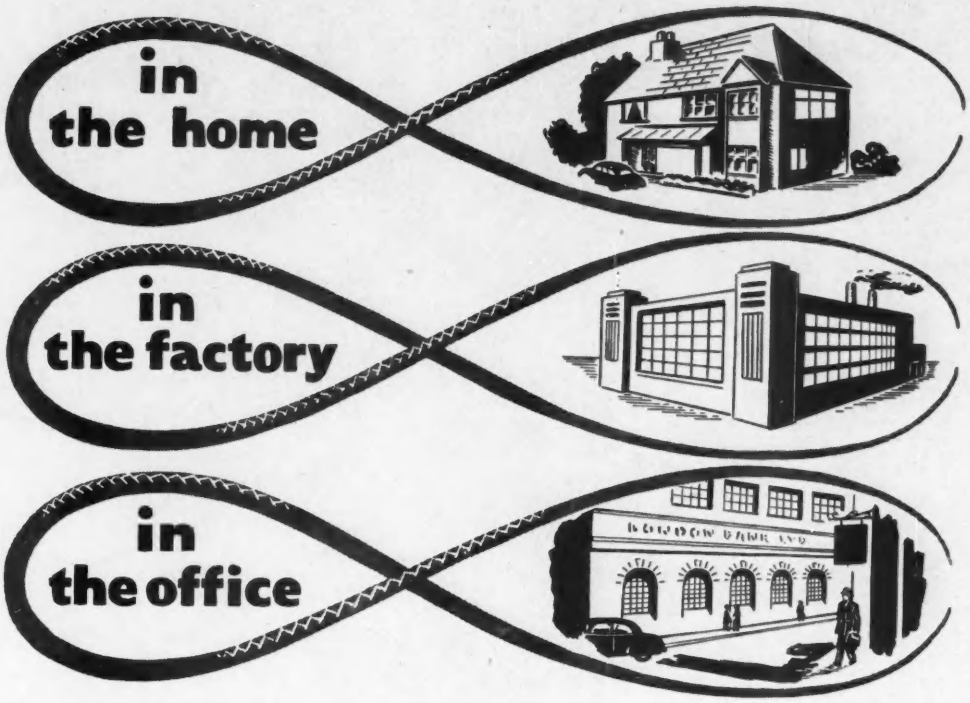

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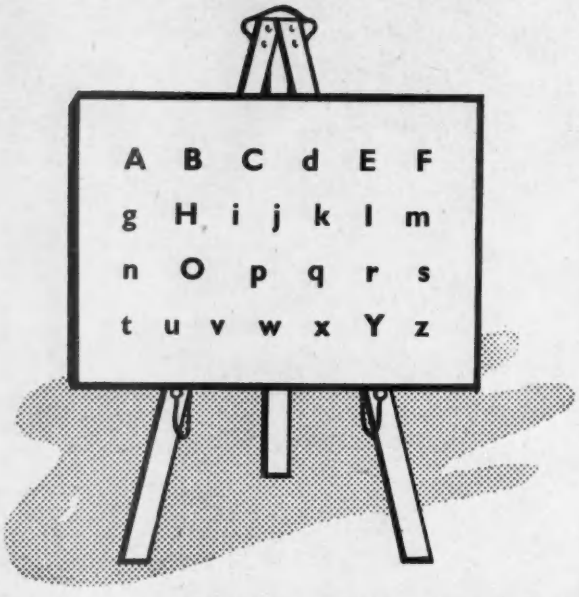

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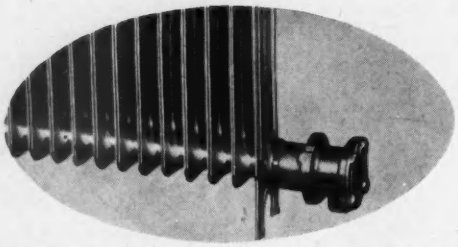

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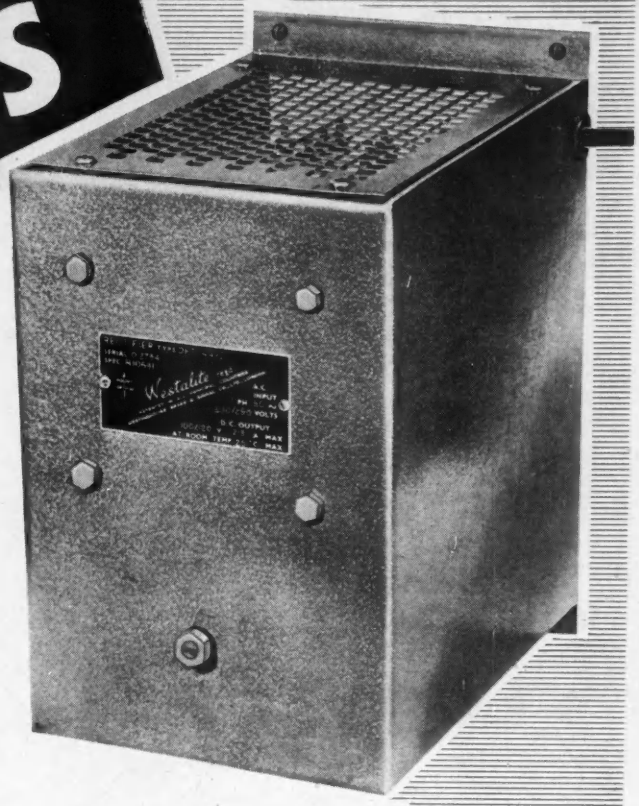

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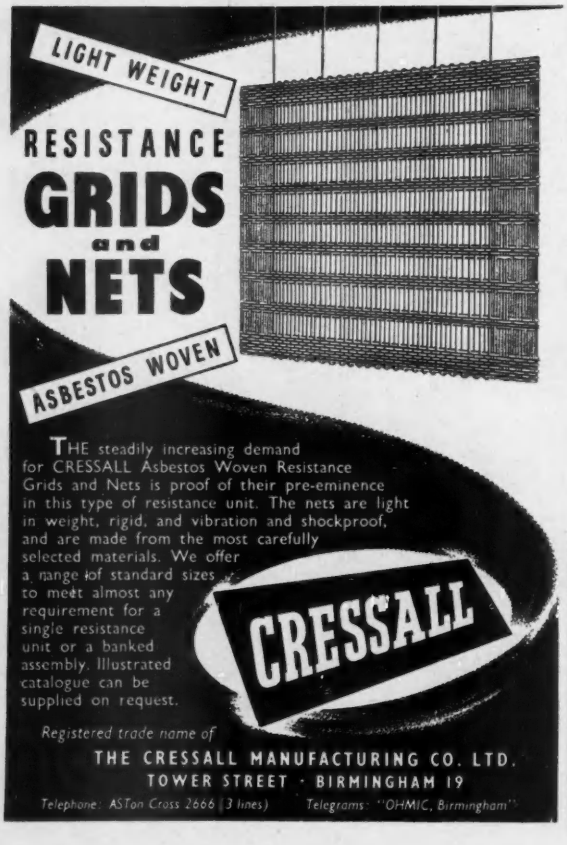
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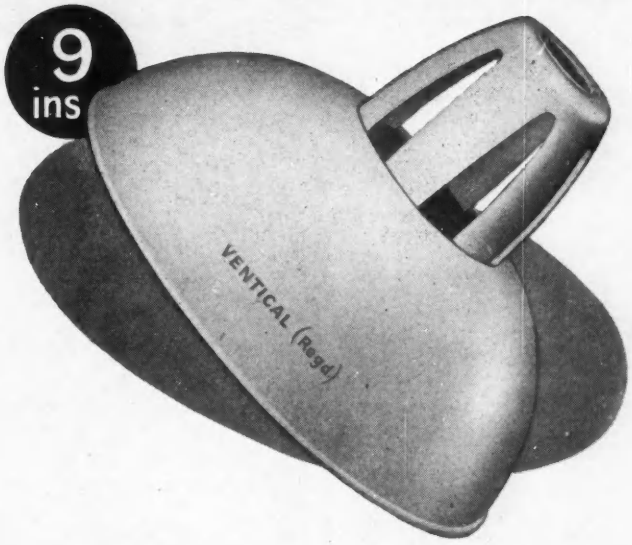

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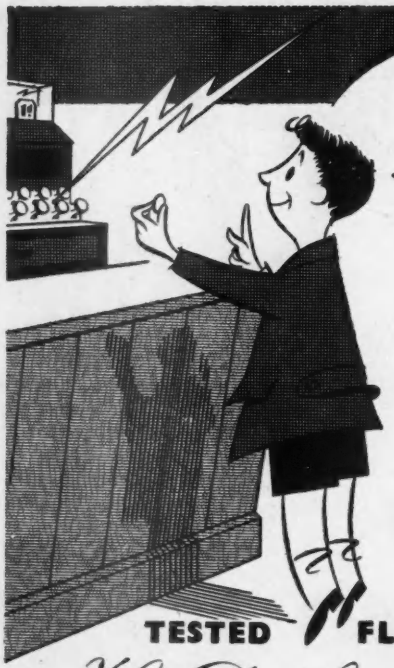

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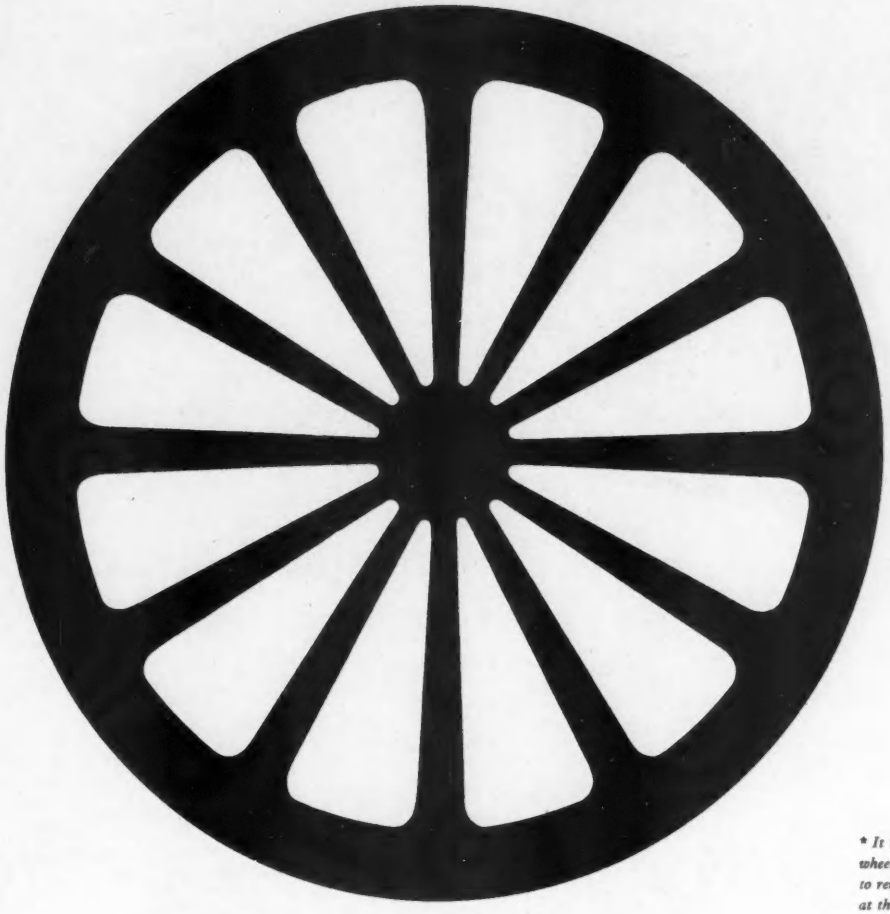

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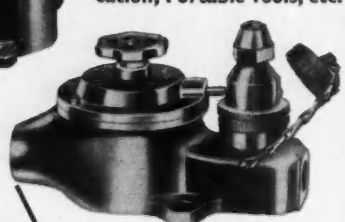

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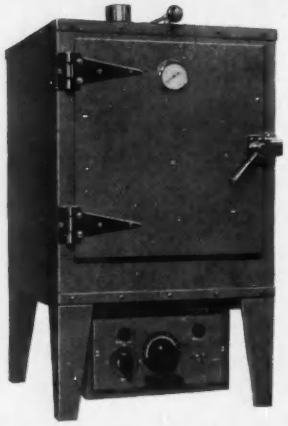

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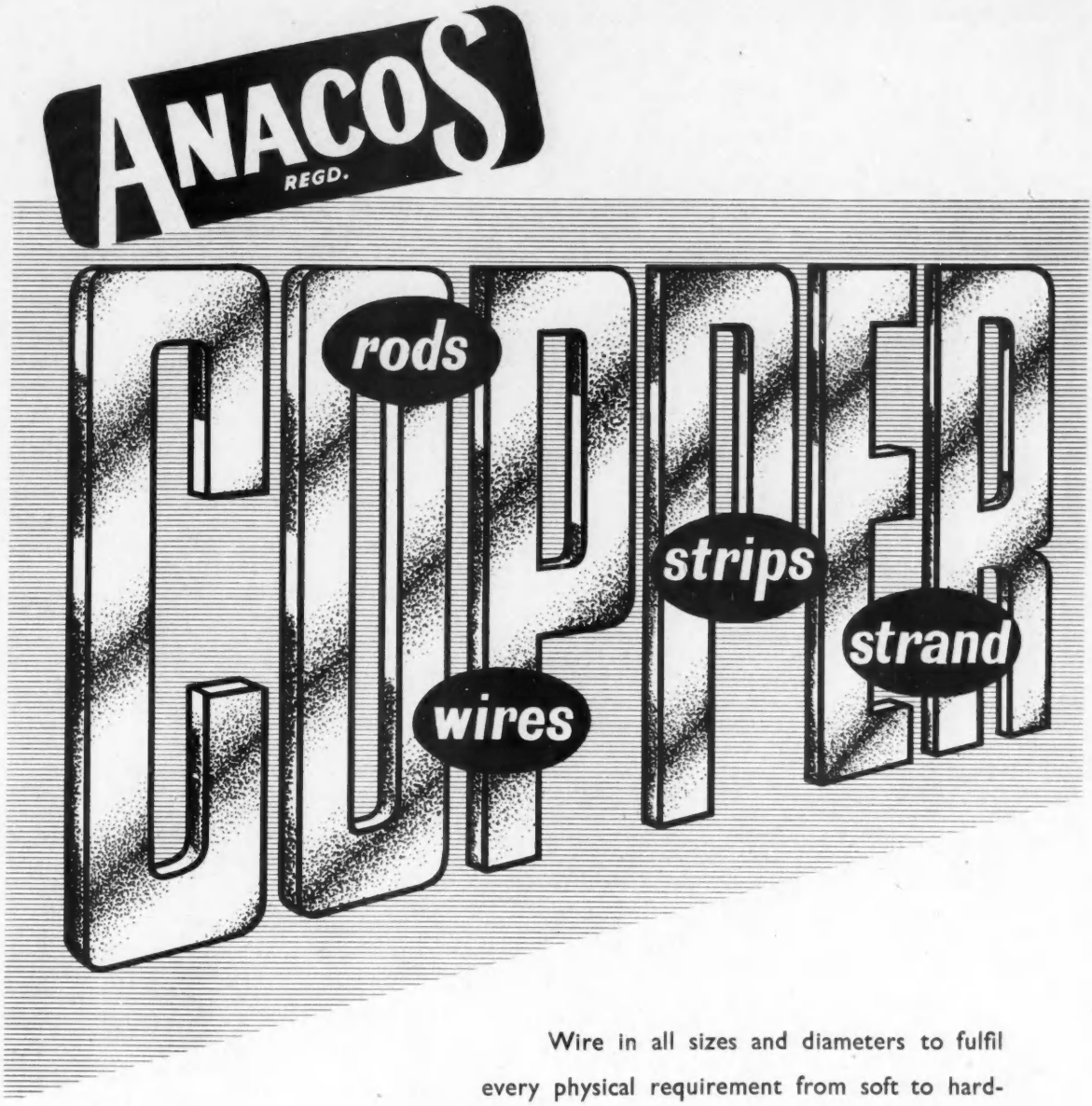

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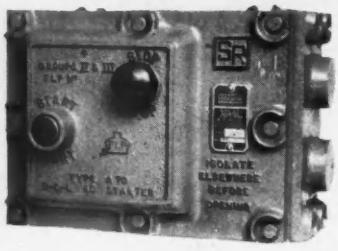

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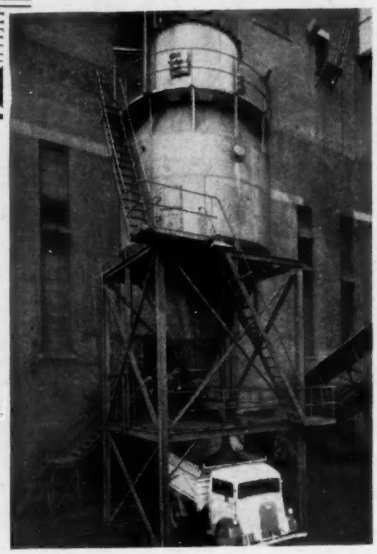

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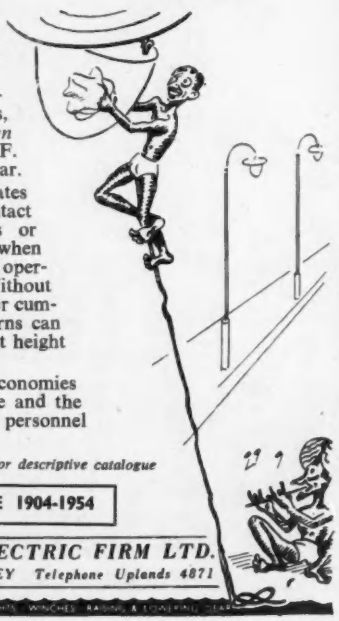

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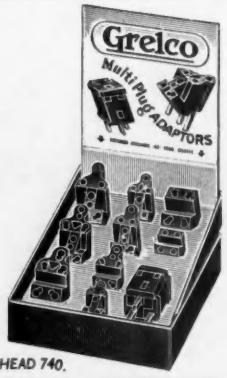

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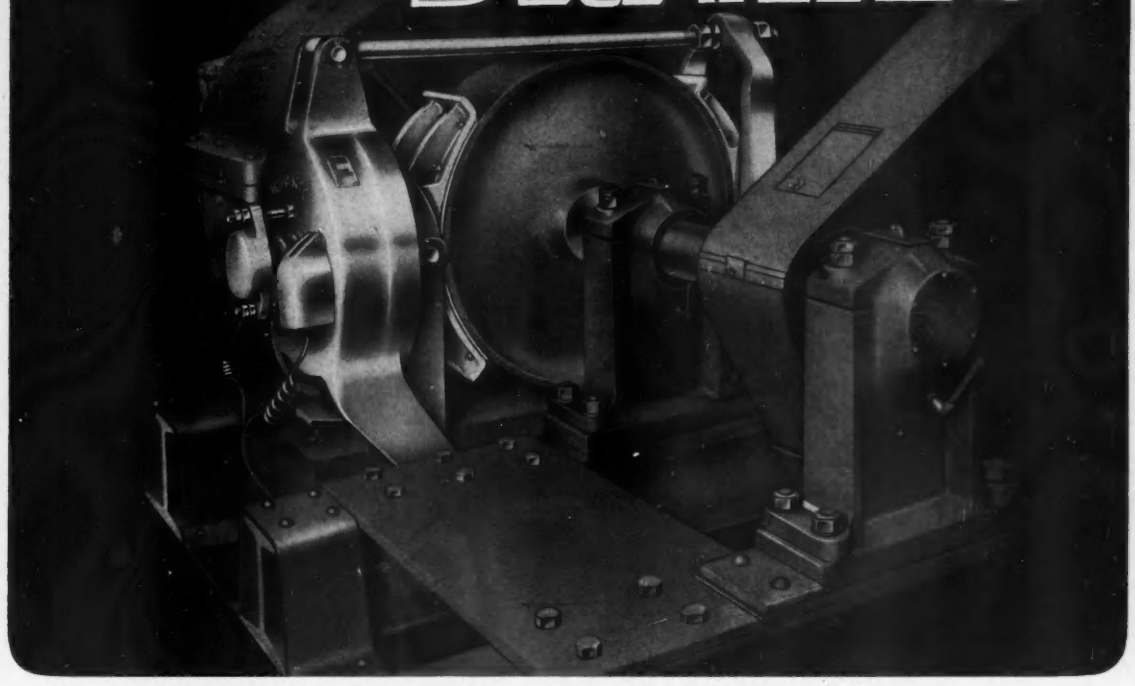

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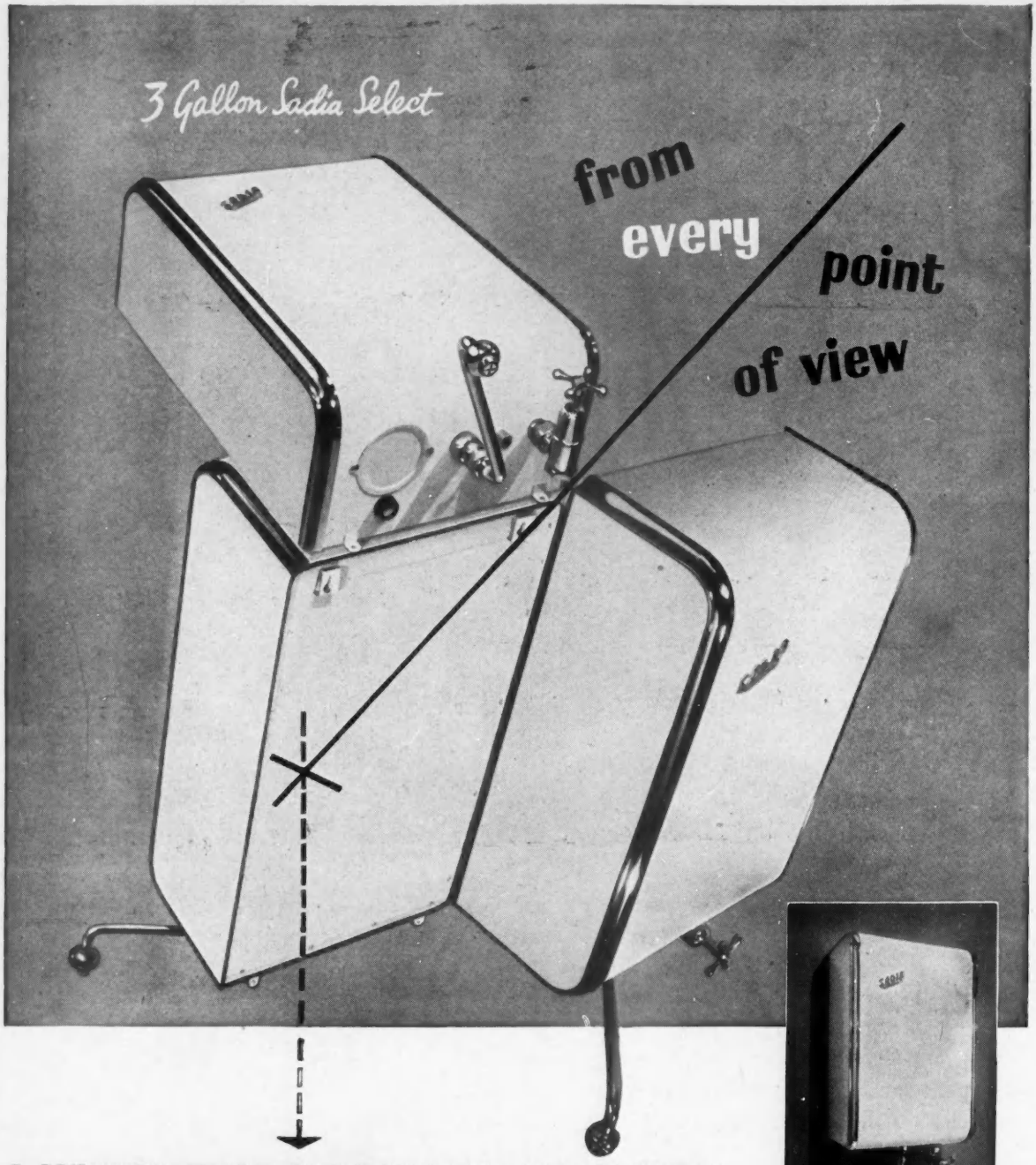

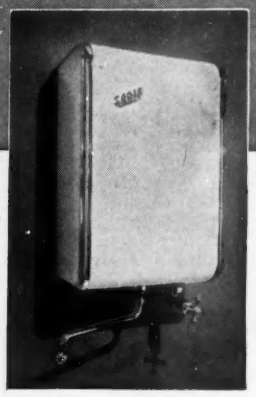

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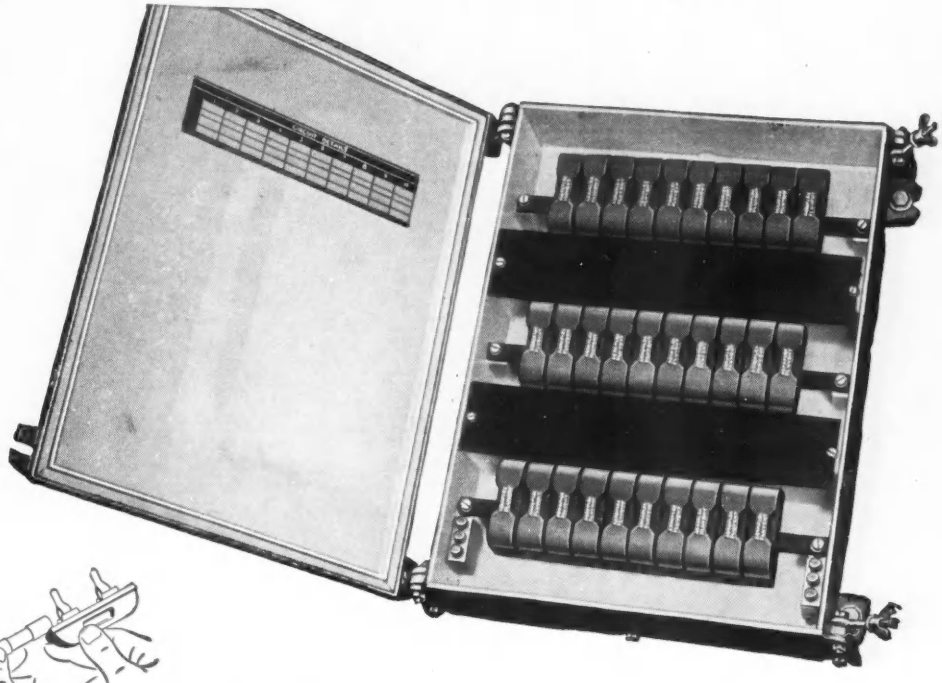

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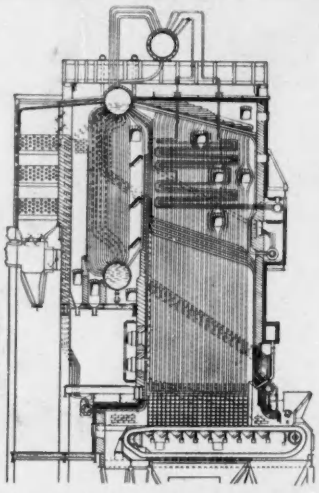

A typical arrangement of a John Thompson 'Radiant Heat' Water Tube Boiler. This, and other types of Water Tube Boilers are used in Power Stations and Industrial Installations.

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